1^{ST}& 2^{nd}YEAR COURSE STRUCTURE

FOR

B.TECH –ELECTRONICS & COMMUNICATION *ENGINEERING*

w.e.f.

2013-2014 ADMITTED BATCH

DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING

COLLEGE OF ENGINEERING (AUTONOMOUS) :: PULIVENDULA

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

PULIVENDULA – 516390, Y.S.R. (DIST), ANDHRA PRADESH, INDIA

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR COLLEGE OF ENGINEERING (Autonomous) PULIVENDULA – 516 390.

Academic Regulations 2013 (R13) for B. Tech (Regular-Full time)

(With effect from the Academic Year 2013-2014 for the students admitted into I year)

1. Award of B.Tech. Degree

A student will be declared eligible for the award of the B.Tech. Degree if he/she fulfils the following academic regulations:

i. **Pursue a course of study for not less than four academic years and in not more than eight academic years.**

ii. **Register for 180 credits and secure all 180 credits**

2. Students, who fail to fulfill all the academic requirements for the award of the degree within eight academic years from the year of their admission, shall forfeit their seat in B.Tech. course and their admission is cancelled.

3. Courses of study

The following courses of study are offered at present under B. Tech. program with effect from the academic year 2013-2014.

S. No.	**Branch**
01.	*Civil Engineering*
02.	*Electrical & Electronics Engineering*
03.	*Mechanical Engineering*
04.	*Electronics and Communication Engineering*
05.	*Computer Science and Engineering*
06.	*Bio Technology*

and any other course as approved by the authorities of the University from time to time.

4. Credits

	I Year		Semester	
	Periods / Week	Credits	Periods / Week	Credits
Theory	03	03	04	03
	04	05	--	--
Practical	03	04	03	02
Project	--	--	15	10

5. Distribution and Weightage of Marks

i. The performance of a student in each semester / I year shall be evaluated subject –wise with a maximum of 100 marks for theory and 75 marks for practical subject. In addition seminar and project work shall be evaluated for 50 and 200 marks respectively.

ii. For theory subjects the distribution shall be 30 marks for Internal Evaluation and 70 marks for the End-Examination.

iii. There shall be five units in each of the theory subjects.

iv. For theory subjects during the semester, there shall be two midterm examinations. Each mid term examination consists of objective paper for 10 marks and subjective paper for 20 marks with duration of 1hour 50 minutes (20 minutes for objective and 90 minutes for subjective paper).

Objective paper is set for 20 bits for 10 marks. Subjective paper shall contain 5 questions of which, student has to answer 3 questions evaluated for 20 marks. First midterm examination shall be conducted for I, II units of syllabus and second midterm examination shall be conducted for III, IV & V units. Final Internal marks for a total of 30marks shall be arrived at by considering the marks secured by the student in both the mid examinations with 80% weight-age to the better mid exam and 20% to the other.

However, for first year, there shall be three midterm examinations as in the above pattern. Final Internal marks for a total of 30 marks shall be arrived at by considering the marks secured by the student in all the three mid examinations* with 80% weightage to the average marks of the best two midterm examinations and 20% to the other.

*****Note 1: 1st midterm examinations, shall be from unit – I, Second midterm examinations shall be from II & III units, and third midterm examinations shall be from IV & V units.

*****Note 2: The subjective paper shall contain 5 questions of equal weightage of 10 marks and the marks obtained for 3questions shall be condensed to 20 marks, any fraction rounded off to the next higher mark.

*****Note 3: The midterm examination shall be conducted first by distribution of the Objective paper simultaneously marking the attendance, after 20 minutes the answered objective paper is to be collected back. The student is not allowed to leave the examination hall. Then the descriptive question paper and the answer booklet shall be distributed. After 90minutes the answered booklets are to be collected back.

v. For practical subjects there shall be a continuous evaluation during the semester for 25 sessional marks and 50 end examination marks. Day-to-day work in the laboratory shall be evaluated for 25 marks by the concerned laboratory teacher based on the report of experiments/jobs. *The end semester practical examination shall be conducted by an external examiner and an internal examiner nominated by the Principal*.

vi. There shall be an audit pass course in Human values & Professional ethics and Advanced Communication skills lab with no credits. There shall be no external examination. However, attendance in the audit course shall be considered while calculating aggregate attendance and student shall be declared pass in the audit course when he/she secures 40% or more in the internal examinations. *If he/she doe not secure 40% in the midterm examinations, he/she has to re-register that subject as and when it is offered.*

vii. For the subject having design and/or drawing, such as Engineering Drawing, Machine Drawing and Estimation, the distribution shall be 30 marks for internal evaluation and 70 marks for end examination. The Internal evaluation for sessionals will be 15 marks for day-to-day work in the class that shall be evaluated by the concerned subject teacher based on the reports/submissions prepared in the class. And there shall be two midterm exams in a semester for a duration of 2hrs each,evenly distributed over the syllabi for 15 marks and the weightage is 80% for better mid marks and 20% for the other shall be considered as internal test marks. The sum of day to day evaluation and the internal test marks will be the final sessionals for the subject. However, when offered in the I year as 5 credits course, there shall be three midterm exams and the weightage is 80% of average marks of the best two midterm examinations and 20% from the other will be taken into consideration.

viii. There shall be a seminar presentation in IV year II Semester. For the seminar, the student shall collect the information on a specialized topic and prepare a technical report, showing his understanding over the topic, and submit to the department before presentation. The report and the presentation shall be evaluated by the departmental committee consisting of Head of the department, seminar supervisor and a senior faculty member. The seminar shall be evaluated for 40 marks. There shall be no external examination for seminar.

There shall be a Comprehensive Viva – Voce in IV year II Semester. The Comprehensive viva-voce will be conducted by the committee consisting of Head of the department and two senior faculty members of the department. The Comprehensive Viva – voce is aimed at to assess the students' understanding in various subjects he/she studies during the B.Tech. course of study. The Comprehensive Viva- Voce is valued for 60 marks by the committee.

A student shall acquire 3 credits assigned to the seminar & comprehensive viva-voce only when he/she secures 40 marks on aggregate out of 100 marks allocated. *If he/she fails to get 40 marks (put together) out of 100, he/she has to re-register for the seminar & comprehensive viva-voce as and when it is offered*.

ix. Out of total of 200 marks for the project work, 60 marks shall be for Internal Evaluation and 140 marks for the End Semester Examination (Viva-voce). Project work shall start in IV- I semester and continue in the next semester. During IV – I semester, the project work (part – A) will be evaluated internally for 30 marks out of allotted internal marks 60, and is given 2 credits. Out of 30 marks, concerned project guide shall evaluate for 15 marks based on day to day performance of the student, and the remaining 15 marks will be evaluated bythe departmental committee consisting of Head, project guide and two senior faculty members of the department on the basis of a seminar given by each student on the topic of his/her project.

At the end of IV – II semester, the remaining internal marks (i.e. 30) for the project work (Part – B) shall be evaluated in the same manner as in IV – I semester. The end semester examination (viva-voce) shall be conducted by a committee consisting of HOD, Project Supervisor and an External Examiner nominated by the Principal at the end of the project work.

x. The laboratory records and internal test papers shall be preserved for minimum of 3 years in the respective institutions as per the University norms and shall be produced to the Committees of the University as and when the same are asked for.

6. Attendance Requirements:

i. A student shall be eligible to appear for end semester examinations if he/she acquires a minimum of 75% of attendance in aggregate of all the subjects in a semester/ I year.

ii. **Shortage of Attendance below 65% in aggregate shall in NO case be condoned**.

iii. Condonation of shortage of attendance in aggregate up to 10% (65% and above and below 75%) in each semester or I year may be granted by the College Academic Committee.

iv. Students whose shortage of attendance is not condoned in any semester / I year are not eligible to take their end examination of that class and their registration shall stand cancelled.

v. A student will not be promoted to the next semester unless he/she satisfies the attendance requirements of the present semester / I year, as applicable. They may seek readmission for that semester / I year when offered next.

vi. A stipulated fee shall be payable towards condonation of shortage of attendance to the institution.

7. Minimum Academic Requirements:

The following academic requirements have to be satisfied in addition to the attendance requirements mentioned in item no.**6**

i. A student shall be deemed to have satisfied the minimum academic requirements and earned the credits allotted to each theory, practical, design, drawing subject or project if he/she secures not less than 35% of marks in the end examination and a minimum of 40% of marks in the sum total of the internal evaluation and end examination taken together. In the Seminar & Comprehensive viva – voce he/she should secure 40% put together.

ii. A student shall be promoted from II to III year only if he fulfills the academic requirement ofsecuring **26 credits (40%)** of the subjects that have been studied up to II year I semester.

a. One regular and one supplementary examinations of I year.

b. One regular examination of II year I semester irrespective of whether the candidate takes the end examination or not as per the normal course of study.

iii. A student shall be promoted from third year to fourth year only if he fulfills the academic requirements of securing 44 **credits(40%)** of the subjectsthat have been studied upto III year I semester from the following examinations,

a. Two regular and two supplementary examinations of I year.

b. Two regular and one supplementary examinations of II year I semester.

c. One regular and one supplementary examinations of II year II semester.

d. One regular examination of III year I semester irrespective of whether the candidate takes the end examination or not as per the normal course of study.

And in case of getting detained for want of credits by sections 7-(ii) and (iii), the student may make up the credits through supplementary exams of the above exams before the date of class work commencement of Third or Fourth year I semester respectively.

iv. A student shall register and put up minimum attendance in all 180 credits and earn all the 180 credits. Marks obtained in all 180 credits shall be considered for the calculation of percentage of marks obtained.

v. Students who fail to earn 180 credits as indicated in the course structure within eight academic years from the year of their admission shall forfeit their seat in B.Tech. course and their admission shall stand cancelled.

8. Course pattern:

i. The entire course of study is of four academic years. The first year shall be on yearly pattern and the second, third and fourth years on semester pattern.

ii. A student eligible to appear for the end examination in a subject, but absent at it or has failed in the end examination may appear for that subject at the next supplementary examination offered.

9.Transitory Regulations:

Candidates who have been detained for want of attendance or not fulfilled academic requirements or who have failed after having undergone the course in earlier regulations or have discontinued and wish to continue the course are eligible for admission into the unfinished semester from the date of commencement of class work with the same or equivalent subjects as and when subjects are offered, subject to Section **2** and they will be in the academic regulations into which the candidate is presently readmitted.

10. With–holding of results:

If the candidate has any dues not paid to the university or if any case of indiscipline or malpractice is pending against him, the result of the candidate shall be withheld and he will not be allowed / promoted into the next higher semester. The issue of awarding degree is liable to be withheld in such cases.

11. Award of Class:

After a student has satisfied the requirements prescribed for the completion of the program and is eligible for the award of B. Tech. Degree he/she shall be placed in one of the following four classes:

<table>
<tr><th>Class Awarded</th><th>% of marks to be secured</th><td rowspan="5">From the aggregate marks secured for the best 180 Credits.</td></tr>
<tr><td>First Class with Distinction</td><td>70% and above</td></tr>
<tr><td>First Class</td><td>Below 70% but not less than 60%</td></tr>
<tr><td>Second Class</td><td>Below 60% but not less than 50%</td></tr>
<tr><td>Pass Class</td><td>Below 50% but not less than 40%</td></tr>
</table>

(The marks in internal evaluation and end examination shall be shown separately in the marks memorandum)

Further, the University, vide its University order RP/No. 164/2013 dt: 02.05.2013, has permitted for rounding of percentages to the extent of 0.5% to effect change of class from pass class to Second class, Second class to First class, First class to First class with distinction for all the courses being offered or to be offered by the college without adding any marks to the original marks secured by the students.

12. Minimum Instruction Days:

The minimum instruction days including exams for each semester / I year shall be 90/180 days respectively.

13. There shall be no branch transfers after the completion of admission process.

14. There shall be no place for transfer within the Constituent Colleges.

15. General:

i. **The academic regulations should be read as a whole for purpose of any interpretation.**

ii. **Malpractices rules- nature and punishments is appended**

iii. **Where the words "he", "him", "his", occur in the regulations, they include "she", "her", "hers".**

iv. **In the case of any doubt or ambiguity in the interpretation of the above rules, the decision of the Principal is final.**

v. **The college may change or amend the academic regulations or syllabi at any time and the changes or amendments shall be made applicable to all the students on roles with effect from the dates notified by the institution.**

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JNTUA COLLEGE OF ENGINEERING (Autonomous) PULIVENDULA

Course structure for I B.TECH. Electronics & Communication ENGINEERING(Regular) with effective from 2013-2014

S.No.	Course Code	Subject Name	Theory/Tutorial	Drawing/Lab	Credits
1	13AHS01	Communicative English	2	-	3
2	13ABS01	Engineering Physics	2	-	3
3	13ABS03	Engineering Chemistry	2	-	3
4	13ABS04	Mathematics – I	3+1	-	5
5	13ACS01	Programming in C and Data Structures	3+1	-	5
6	13ABS05	Mathematics – II	3+1	-	5
7	13AEC01	Network Analysis	3+1	-	5
8	13ACS02	Programming in C and Data Structures Lab	-	3	4
9	13ABS02	Engineering Physics & Engineering Chemistry Lab*	-	3	4
10	13ACS03	Engineering & IT+ Workshop	-	3	4
11	13AHS02	English Language Comm. Skills Lab	-	3	4
		Total	22	12	45
		Total Contact Periods/Week : 34			
		Total Credits(7 Theory +4 Labs) : 45			

* The student shall attend the Physics lab and Chemistry lab in alternative weeks. The end exam shall be conducted separately and average of the two exams shall be recorded by the University exam section.

The students shall attend Engineering and IT work shop as a single lab every week and the end exam is conducted as a single lab. Sharing the maximum marks and time for one task each from Engineering workshop and IT workshop. The sum of the marks awarded shall be recorded.

Note: Engineering drawing shall be offered in II/I or II/II Semester.

II B.Tech I Semestar

S. No	Course code	Subject	Theory/Tutorial	Drawing/Lab	Credits
1	13ABS07	Mathematics - III	3+1		3
2	13AME05	Engineering Drawing	1	3	3
3	13AEC02	Electronic Devices & Circuits	3+1	-	3
4	13AEC04	Signals & Systems	3+1	-	3
5	13AEC05	Switching Theory & Logic Design	3+1	-	3
6	13AEE04	Electrical Technology	3+1	-	3
7	13AHS03	Human Values and Professional Ethics (Audit Course)	2	-	--
8	13AEE05	Electrical Engineering Lab	-	3	2
9	13AEC03	Electronic Devices & Circuits Lab	-	3	2
		Total	23	9	22
		Total Contact periods/week 32			
		Total Credits (6 Theory + 2 Labs) : 22			

II B.Tech I Semestar

S. No	Course code	Subject	Theory/Tutorial	Drawing/Lab	Credits
1	13ABS10	Environmental Science	4		3
2	13AEC07	Pulse & Digital Circuits	4		3
3	13AEC09	Electronic Circuit Analysis & Design	4		3
4	13AEC11	Electromagnetic Theory & Transmission Lines	4		3
5	13AEC12	Probability Theory & Stochastic Processes	4		3
6	13AEC13	Analog Communication Systems	4		3
7	13AEC08	Electronic Circuit Analysis & Design Lab		3	2
8	13AEC10	Pulse & Digital Circuits Lab		3	2
		Total	24	6	22
		Total Contact periods/week 30			
		Total Credits (6 Theory + 2 Labs)			

III Year B. Tech - I Semester

S. No	Course code	Subject	Theory/Tutorial	Drawing/Lab	Credits
1	13AEC15	Control Systems Engineering	3+1		3
2	13AEC16	Computer Architecture and Organization	3+1		3
3	13AEC17	Antennas & Wave Propagation	3+1		3
4	13AEC18	Digital Communication Systems	3+1		3
5	13AEC19	Linear IC Applications	3+1		3
6	13AEC21	Digital IC Applications	3+1		3
7	13AEC20	IC Applications Lab		3	2
8	13AEC22	Analog Communication Systems Lab		3	2

9	13AEC23	Comprehensive Online Examination			1
		Total	24	6	23
		Total Contact periods/week 30			
		Total Credits : 23			

III Year B. Tech - II Semester

S.No.	**Course Code**	**Subject Name**	**Theory/Tutorial**	**Drawing/ Lab**	**Credits**
1	13AEC24	Computer Networks	3+1	-	3
2	13AEC25	Microprocessors & Microcontrollers	3+1	-	3
3	13AEC26	Digital Signal Processing	3+1	-	3
4	13AEC27	Microwave Engineering	3+1	-	3
5	13AEC28	Electronic Measurements & Instrumentation	3+1	-	3
6	**Choice Based Credit Course(Inter Department)** **ANNEXURE-I**		3+1	-	3
7	13AEC32	Microprocessors & Microcontrollers Lab		3	2
8	13AHS05	Advanced Comm. skills Lab(Audit course)		3	
9	13AEC33	Digital Communication Systems Lab		3	2
10	13AEC34	Comprehensive Online Examination			1
		Total	**24**	**09**	**23**
		Total contact periods/week : 33			
		Total Credits : 23			

ANNEXURE-I (Choice based credit course of inter department)

Branch	**Course Code**	**Subjects**
Physics	13ABS11	Nanomaterials And Engineering Application
Chemistry	13ABS12	Green Chemistry and Catalysis for Sustainable Environment
	13ABS13	Instrumental Methods of Chemical Analysis
	13ABS14	Chemistry of Nano Material and Application
English	13AHS07	Campus Recruitment Training & Soft Skills
	13AHS08	Competitive & Spoken English
Mathematics	13ABS15	Mathematical Modeling and Simulation
	13ABS16	Optimization Techniques
CE	13ACE27	Green Buildings
	13ACE28	Disaster Management and Mitigation
	13ACE29	Water Harvesting and Conservation
EEE	13AEE23	Renewable energy sources

	13AEE14	Power Electronics
	13AEE24	Electrical energy Management & Conservation
ME	13AME30	Robotics
	13AME31	Mechanical Manufacturing Process
	13AME32	Non Conventional Sources of Energy
ECE	13AEC29	Fundamentals of communication Systems
	13AEC30	Industrial Electronics
	13AEC31	Neural Networks & Fuzzy Logic
CSE	13ACS14	Operating Systems
	13ACS18	Database Management Systems
	13ACS27	Java Programming
BT	13ABT27	Immunology
	13ABT28	Downstream Processing
	13ABT29	Transport Phenomena in Bioprocess

IV Year B. Tech - I Semester

S.No.	Course Code	Subject Name	Theory/Tutorial	Drawing/Lab	Credits
1	13AHS06	Managerial Economics & Financial Analysis	3+1	-	3
2	13AEC35	VLSI Design	3+1	-	3
3	13AEC36	Optical Fiber Communication	3+1	-	3
4	13AEC37	Embedded Systems	3+1	-	3
5	**Choice Based Credit Course-I(Department specific)**				
	13AEC38	Digital Image Processing	3+1	-	3
	13AEC39	DSP Processors and Architectures			
	13AEC40	Software Defined Radio			
6	**Choice Based Credit Course-II(Department specific)**				

	13AEC41	Bio-Medical Instrumentation	3+1	-	3
	13AEC42	T.V Engineering			
	13AEC43	Advanced DSP			
7	13AEC44	VLSI & Embedded Systems Lab		3	2
8	13AEC45	Microwave & Optical Communications Lab		3	2
		Total	**24**	**6**	**22**
		Total contact periods/week : 30			
		Total Credits : 22			

IV Year B. Tech - II Semester

S.No.	Course Code	Subject Name	Theory/Tutorial	Drawing/Lab	Credits
1	13AEC46	Mobile Communication	3+1	-	3
2	13AEC47	Management Science	3+1	-	3
3	**MOOC-I**	**Subject -I**	3+1	-	3
		Subject -II			
	MOOC-II	**Subject -III**	3+1	-	3
		Subject -IV			
4		Comprehensive Viva-voce	-	-	1
5		Seminar & Project Work		20	10
		Total	**16**	**20**	**23**
		Total contact periods/week : 36			
		Total Credits : 23			

ECE -I YEAR

COMMUNICATIVE ENGLISH

1. INTRODUCTION:

English is an international language as well as a living and vibrant one. People have found that knowledge of English is a passport for better career, better pay, advanced knowledge and for communication with the entire world. As it is a language of opportunities in this global age, English is bound to expand its domain of use everywhere. The syllabus has been designed to enhance communication skills of the students of engineering and technology. The prescribed books serve the purpose of preparing them for everyday communication and to face the global competitions in future.

The first text prescribed for detailed study focuses on LSRW skills and vocabulary development. The teachers should encourage the students to use the target language. The classes should be interactive and student-centered. They should be encouraged to participate in the classroom activities keenly.

The text for non-detailed study is meant for extensive reading/reading for pleasure by the students. They may be encouraged to read some select topics on their own, which could lead into a classroom discussion. In addition to the exercises from the texts done in the class, the teacher can bring variety by using authentic materials such as newspaper articles, advertisements, promotional material etc.

2. OBJECTIVES:

1. To enable the students to communicate in English for academic and social purpose
2. To enable the students to acquire structure and written expressions required for their profession.
3. To develop the listening skills of the students
4. To inculcate the habit of reading for pleasure
5. To enhance the study skills of the students with emphasis on LSRW skills

3. SYLLABUS:

UNIT –I

1. **Chapter titled –ASTROLOGER'S DAY (Humour) from "Using English"**
2. **Chapter titled 'HOMI JEHANGIR BHABHA' from 'New Horizons'**

L- Listening -Techniques - Importance of phonetics
L- Meet & Greet and Leave taking, Introducing Oneself and Others (Formal and Informal situations)
R- -Reading Strategies -Skimming and Scanning
W- Writing strategies- sentence structures
G-Parts of Speech –Noun-number, pronoun-personal pronoun, verb- analysis
V-Affixes-prefix and suffix, root words, derivatives

UNIT –II

1. **Chapter titled –BUILDING A NEW STATE (Inspiration) from "Using English"**
2. **Chapter titled 'MY STRUGGLE FOR AN EDUCATION' from "New Horizons"**

L- Listening to details
S- Apologizing, Interrupting, Requesting and Making polite conversations
R-note making strategies
W- Paragraph-types- topic sentences, unity, coherence, length , linking devices
G-Auxiliary verbs and question tags
V- synonyms-antonyms, homonyms , homophones, homographs, words often confused

UNIT –III

1. **Chapter titled WATER THE ELIXIR OF LIFE ('Sustainable Development) from "Using English"**
2. **Chapter titled 'THE AUTOBIOGRAPHY OF ABRAHAM LINCOLN' from "New Horizons"**

L- Listening to themes and note taking
S- Giving instructions and Directions, making suggestions, Accepting ideas, fixing a time and Advising

R- Reading for details -1

W- Resume and cover letter

G- Tenses – Present tense, Past tense and Future tense

V-Word formation and One-Word Substitutes

UNIT –IV

1. **Chapter titled THE WOODROSE ('Relationships') from "Using English"**
2. **Chapter titled 'THE HAPPY PRINCE' from "New Horizons"**

L- Listening to news

S- Narrating stories, Expressing ideas and opinions and telephone skills

R- Reading for specific details and Information

W- Technical Report writing-strategies, formats-types-technical report writing

G- Voice and Subject – Verb Agreement

V- Idioms and prepositional Phrases

UNIT –V

1. **Chapter titled PROGRESS 'Science and Humanism' from "Using English"**
2. **Chapter titled 'IF' from "New Horizons"**

L -Listening to speeches

S- Making Presentations and Group Discussions

R- Reading for Information

W- E-mail drafting

G- Conditional clauses and conjunctions

V- Collocations and Technical Vocabulary and using words appropriately

4.EXPECTED OUTCOME:

The students will get the required training in LSRW skills through the prescribed texts and develop communicative competence

Prescribed Books:

1. **Using English** published by Orient Black Swan,2013
2. **New Horizons** published by Pearson,2013

SUGGESTED READING:

1. **Raymond Murphy's English Grammar with CD,** Murphy, Cambridge University Press, 2012.
2. **English Conversation Practice –**Grant Taylor, Tata McGraw Hill,2009.
3. **Communication SKILLS, Sanjay Kumar & Pushpalatha** Oxford University Press, 2012.
4. **A Course in Communication Skills**- Kiranmai Dutt & co. Foundation Books, 2012.
5. **Living English Structures**- William Standard Allen-Pearson, 2011.
6. **Current English grammar and usage-**S M Guptha, PHI, 2013.
7. **Modern English Grammar-**Krishna SWAMI .McMillan, 2009.
8. **Powerful Vocabulary Builder**- Anjana Agarwal New Age International Publishers, 2011.

ECE-I YEAR

ENGINEERING PHYSICS

(Common to all branches of Engineering)

PREAMBLE:

The study of Engineering Physics leads to the development of scientific temper and analytical capability through learning physical concepts and their applications in engineering and technology fields. Comprehension of some basic physical concepts will enable the students to logically solve engineering problems.

UNIT 1:PHYSICAL OPTICS, LASERS AND FIBRE OPTICS

Objectives: To evoke interest on applications of superposition effects like interference and diffraction, the mechanisms of emission of light, achieving amplification of electromagnetic radiation through stimulated emission, study of propagation of light through transparent dielectric waveguides along with engineering applications.

Physical Optics: Interference – Formation of Newton's Rings by reflection –Working principle of Michelson Interferometer - Fraunhofer diffraction due to single slit, double slit and diffraction grating.

Lasers: Characteristics of laser – Spontaneous and stimulated emission of radiation –- Einstein's coefficients –– Population inversion – optical resonator - He-Ne laser – CO_2 laser – Semiconductor laser - Applications of lasers - Holography

Fiber optics: Structure and working principle of optical fiber –Numerical aperture and acceptance angle – Types of optical fibers – Attenuation and losses in fibers - Optical fiber communication system – Fiber optic sensors

UNIT 2:CRYSTALLOGRAPHY AND ULTRASONICS

Objectives: To enlighten the periodic arrangement of atoms in crystals, direction of Bragg planes, crystal structure determination by X-rays and also to understand different types of defects in crystals and non-destructive evaluation using ultrasonic techniques.

Crystallography: Introduction – Space lattice –Unit cell – Lattice parameters –Bravias lattice – Crystal systems – Packing fractions of SC, BCC and FCC - Structures of NaCl and Diamond – Directions and planes in crystals – Miller indices – Interplanar spacing in cubic crystals – Bragg's law - X-ray diffraction – Bragg's Spectrometer – Defects in solids: point defects.

Ultrasonics: Introduction – Production of ultrasonics by Magnetrostriction & piezoelectric methods – Properties and detection – Applications in non-destructive testing.

UNIT 3:QUANTUM MECHANICS AND FREE ELECTRON THEORY

Objectives: To get an insight into the microscopic meaning of conductivity , classical and quantum free electron model, the effect of periodic potential on electron motion, evolution of band theory to distinguish materials and to understand electron transport mechanism in solids.

Quantum Mechanics: Introduction to matter waves – de'Broglie hypothesis - Heisenberg's uncertainty principle - Schrodinger's time independent and time dependent wave equation – Significance of wave function - Particle in one dimensional infinite potential well - Eigen values and Eigen functions.

Free electron theory: Classical free electron theory – Equation for electrical conductivity - Quantum free electron theory – Fermi-Dirac distribution –Kronig-Penny model (qualitative) – Origin of bands in solids – Classification of solids into conductors, semiconductors and insulators.

UNIT 4:SEMICONDUCTORS, MAGNETIC MATERIALS AND DIELECTRICS

Objectives: To open new avenues of knowledge and understanding semiconductor based electronic devices , basic concepts and applications of semiconductors, magnetic materials and dielectrics have been introduced which find potential in the emerging micro device applications.

Semiconductors: Introduction – Intrinsic and extrinsic semiconductors – Drift & diffusion currents and Einstein's equation – Hall effect - Direct and indirect band gap semiconductors – Working principle of p-n junction diode.

Magnetic materials: Introduction and basic definitions – Origin of magnetic moments – Bohr magnetron – Classification of magnetic materials into dia, para, ferro, antiferro and ferri magnetic materials (Qualitative) – Hysteresis - Soft and hard magnetic materials and applications.

Dielectrics: Dielectric Polarization – Types of Polarization – Lorentz field – Clausius-Mosotti equation.

UNIT 5: **SUPERCONDUCTIVITY AND PHYSICS OF NANOMATERIALS**

Objectives: To give an impetus on the subtle mechanism of superconductors in terms of conduction of electron pairs using BCS theory, different properties exhibited by them and their fascinating applications. Considering the significance of microminiaturization of electronic devices and significance of low dimensional materials, the basic concepts of nanomaterials, their synthesis, properties and applications in emerging technologies are elicited.

Superconductivity: Introduction – Meissner effect - Properties of superconductors – Type I and type II superconductors – Flux quantization – BCS theory (qualitative) – High T_c superconductors - Applications of superconductors.

Physics of Nanomaterials: Introduction - Significance of nanoscale - Surface area and quantum confinement – Physical properties: optical, thermal, mechanical and magnetic properties – Synthesis of nanomaterials: ball mill, chemical vapour deposition, and thermal evaporation – Carbon nanotubes – properties – High strength applications - Graphene- Properties – Applications.

OUTCOMES:

- The different realms of physics and their applications in both scientific and technological systems are achieved through the study of physical optics, lasers and fibre optics.
- The important properties of crystals like the presence of long-range order and periodicity, structure determination using X-ray diffraction are focused along with defects in crystals and ultrasonic non-destructive techniques.
- The discrepancies between the classical estimates and laboratory observations of physical properties exhibited by materials would be lifted through the understanding of quantum picture of subatomic world.
- The electronic and magnetic properties of materials were successfully explained by free electron theory and the basis for the band theory are focussed.
- The properties and device applications of semiconducting, magnetic and dielectric materials are illustrated.
- The importance of superconducting materials and nanomaterials along with their engineering applications are well elucidated.

Prescribed Text books:

1. Engineering Physics – Hitendra K Mallik and AK Singh
MacGraw Hill Publishers, New Delhi
2. Engineering physics – S. ManiNaidu, Pearson Education, New Delhi
3. Engineering Physics – K.Thyagarajan, MacGraw Hill Publishers, NewDelhi

Reference Books:

1. Engineering Physics – B K Pandey, S. Chaturvedi, Cengage Learning, New Delhi
2. Engineering Physics – V.Rajendran, MacGraw Hill Publishers, NewDelhi
3. Engineering Physics - Sanjay D. Jain, Girish D Sahasrabudhe
University Press, Hyderabad

3. Engineering physics – M.N. Avadhanulu and P.G. KrshiSagar,
Chand and Co, New Delhi
4. Text book of Nanoscience and Nanotechnology: B S Murthy, P.Shankar,
Baldev Raj B B Rath, James Murday, University Press
5. Carbon nanotubes and Graphene Device Physics – H.S. Philip Wong, Deji
Akinwande, Cambridge University Press

ECE -I YEAR

ENGINEERING CHEMISTRY

Preamble: Knowledge in chemistry serves as basic nutrient for the understanding and thereby design of materials of importance in life. Thus the advancement in Engineering is depending on the outcome of basic sciences. Many advances in engineering either produce a new chemical demand as in the case of polymers or wait upon chemical developments for their applications as in the case of implants and alloys. Currently the electronics and computer engineers are looking forward for suitable biopolymers and nano materials for use in miniature super computers, the electrical engineers are in search of proper conducting polymers, the mechanical engineers are on lookout for micro fluids and the civil engineers are looking for materials that are environmental friendly, economical but long lasting.

COURSE OBJECTIVES (CO):

- The Engineering Chemistry course for undergraduate students is framed to strengthen the fundamentals of chemistry and then build an interface of theoretical concepts with their industrial/engineering applications.
- The course main aim is to impart in-depth knowledge of the subject and highlight the role of chemistry in the field of engineering.
- The lucid explanation of the topics will help students understand the fundamental concepts and apply them to design engineering materials and solve problems related to them. An attempt has been made to logically correlate the topic with its application.
- The extension of fundamentals of electrochemistry to energy storage devices such as commercial batteries and fuel cells is one such example.
- After the completion of the course, the student would understand about the concepts of chemistry in respect of Electrochemical cells, fuel cells, mechanism of corrosion and factors to influence, polymers with their applications, engineering materials and water chemistry.

UNIT.1: ELECTROCHEMISTRY

i).Review of electrochemical cells, Numerical calculations, Batteries: Rechargeable batteries (Lead acid, Ni-Cd, Lithium Ion Batteries), Fuels cells: (Hydrogen-Oxygen and Methanol-Oxygen)

ii). Voltammetry: Basic Principles and applications (Ferrous/Ferric System)

Electrochemical sensors: Potentiometric Sensors and voltammetric sensors. Examples : analysis of Glucose and urea

iii).Corrosion: Electrochemical Theory of corrosion, Factors affecting the corrosion. Prevention: Anodic and cathodic protection and electro and electroless plating.

UNIT.2: POLYMERS

i).Introduction to polymers, Polymerisation process, mechanism: cationic, anionic, free radical and coordinate covalent, Polydispercity Index.

Elastomers (rubbers)

Natural Rubber; Compounding of Rubber

Synthetic Rubber: Preparation, properties and engineering applications of Buna-S, buna-N, Polyurethene, Polysulfide (Thiokol) rubbers

Plastomers: Thermosetting and Thermoplatics, Preparation, properties and Engineering applications , PVC, Bakelite, nylons, Polyester ii).Conducting polymers: Mechanism, synthesis and applications of polyacetyline, polyaniline.

iii).Liquid Crystals: Introduction, classification and applications

iv).Inorganic Polymers: Introduction, Silicones, Polyphospazins (-(R)2-P=N-), applications

UNIT.3: FUEL TECHNOLOGY

Classifications of Fuels – Characteristics of Fuels- Calorific Value – Units, Numerical Problems.

i). Solid Fuels–Coal, Coke : Manufacture of Metallurgical Coke by Otto Hoffmann's by product oven processes.

ii).Liquid Fuels:

Petroleum: Refining of Petroleum, Gasoline: Octane Number, Synthetic Petrol: Bergius Processes, Fischer Troph's synthesis

Power Alcohol: Manufacture, merits and demerits of Power Alcohol

iii). Gaseous Fuels: Origin, Production and uses of Natural gas, Producer gas, Water gas, Coal gas and Biogas. Flue Gas analysis by Orsat's apparatus, Solving of problems on Combustion.

iv). Bio Fuels: Biogas, Biodiesel and their significance

UNIT.4: CHEMISTRY OF ENGINEERING MATERIALS

i).Semiconducting and Superconducting materials-Principles and some examples

ii).Magnetic materials – Principles and some examples

iii).Cement: Composition, Setting and Hardening (Hydration and Hydrolysis)

iv).Refractories: Classification , properties and applications

v).Lubricants: Classification and characteristics of lubricants, Theory of lubrication.

vi). Rocket Propellants: Classification, Characteristics of good propellant

UNIT.5: WATER TREATMENT

Impurities in water, Hardness of water and its Units, Disadvantages of hard water, Estimation of hardness by EDTA method, Numerical problems on hardness, Estimation of dissolved oxygen, Alkalinity, acidity and chlorides in water, Water treatment for domestic purpose (Chlorination, Bleaching, ozonisation, U.V. treatment)

Industrial Use of water:

For steam generation, troubles of Boilers: Scale & Sludge, Priming and Foaming, Caustic Embrittlement and Boiler Corrosion.

Treatment of Boiler Feed water:

Internal Treatment: Colloidal, Phosphate, Carbonate, Calgon and sodium aluminate treatment.

External Treatment: Ion-Exchange and Permutit processes.

Demineralisation of brackish water: Reverse Osmosis and Electrodialysis

EXPECTED OUTCOMES (EO): The student is expected to:

- Understand the electrochemical sources of energy
- Understand industrially based polymers, various engineering materials.
- Differentiate between hard and soft water. Understand the disadvantages of using hard water domestically and industrially. Select and apply suitable treatments domestically and industrially.

Text Books:

1. Engineering Chemistry by KNJayaveera, GVSubba Reddy and C. Ramachandraiah, McGraw Hill Higher Education, New Delhi, Foruth Edition, 2012.

2. A Text book of Engineering Chemistry by S.S Dhara, S.S.Umare, S. Chand Publications, New Delhi, 12th Edition, 2010.

REFERENCES:

1. A Text Book of Enigneering Chemistry, Jain and Jain, Dhanapath Rai Publishing Company, New Delhi, 15th Edition, 2010.
2. Engineering Chemistry, K. Sesha Maheswaramma and Mrudula Chugh, Pearson Education, First Edition, 2013.
3. Engineering Chemistry by K.B.Chandra Sekhar, UN.Das and Sujatha Mishra, SCITECH, Publications India Pvt Limited, Chennai, 2nd Edition, 2012.
4. Concepts of Engineering Chemistry- Ashima Srivastavaf and N.N. Janhavi, Acme Learning Pvt Ltd, First Edition, 2013.
5. Text Book of Engineering Chemistry – C. Parameswara Murthy, C.V.Agarwal and Andra Naidu, BS Publications, Hyderabad, 3rd Edition, 2008.
6. Text Book of Engineering Chemistry, Shashichawla, Dhanapath Rai Publications, New Delhi, 4th Edition, 2011

ECE -I YEAR

MATHEMATICS-I

Objectives

 To train the students thoroughly in Mathematical concepts of ordinary differential equations and their applications in electrical circuits, deflection of beams, whirling ofshafts.

 To prepare students for lifelong learning and successful careers using mathematical concepts of differential, Integral and vector calculus, ordinary differential equationsand Laplace transforms.

 To develop the skill pertinent to the practice of the mathematical concepts including the students abilities to formulate the problems, to think creatively and to synthesizeinformation.

UNIT – I

Exact, linear and Bernoulli equations. Applications to Newton’s law of cooling, law of natural growth and decay, orthogonal trajectories.

Non-homogeneous linear differential equations of second and higher order with constant coefficients with RHS term of the type eax, Sin ax, cos ax, polynomials in x, eax V(x), xV(x), method of variation of parameters. Applications to oscillatory electrical circuits, Deflection of Beams, whirling of shafts.

UNIT – II

Taylor’s and Maclaurin’s Series - Functions of several variables – Jacobian – Maxima and Minima of functions of two variables, Lagrange’s method of undetermined Multipliers with three variables only. Radius of curvature, center of curvature, Involutes evolutes, envelopes.

UNIT – III

Curve tracing – Cartesian, polar and parametric curves. Length of curves.

Multiple integral – Double and triple integrals – Change of Variables – Change of order of integration. Applications to areas and volumes, surface area of solid of revolution in Cartesian and polar coordinates using double integral.

UNIT – IV

Laplace transform of standard functions – Inverse transform – First shifting Theorem, Transforms of derivatives and integrals – Unit step function – Second shifting theorem – Dirac’s delta function – Convolution theorem – Laplace transform of Periodic function. Differentiation and integration of transform – Application of Laplace transforms to ordinary differential equations of first and second order.

UNIT – V

Vector Calculus: Gradient – Divergence – Curl and their properties; Vector integration – Line integral - Potential function – Area – Surface and volume integrals. Vector integral theorems: Green’s theorem – Stoke’s and Gauss’s Divergence Theorem (Without proof). Application of Green’s – Stoke’s and Gauss’s Theorems.

TEXT BOOKS:

1. Higher Engineering Mathematics, B.S.Grewal, Khanna publishers-42 Edition(2012)
2. Engineering Mathematics, Volume - I, E. Rukmangadachari & E. Keshava Reddy, Pearson Publisher 1st Edition (2010)

REFERENCES:

1. Engineering Mathematics Volume-I, by T.K.V. Iyengar, S.Chand publication-12thEdition(2013)
2. Engineering Mathematics, Volume - I, by G.S.S.Raju, CENGAGE publisher.(2013)
3. Advanced Engineering Mathematics, by Erwin Kreyszig, Wiley India-10thEdition(2012)
4. Higher Engineering Mathematics, by B.V.Ramana, Mc Graw Hill publishers(2008)
5. Advanced Engineering Mathematics, by Alan Jeffrey, Elsevier-1st Edition(2001)

Outcomes:

 The students become familiar with the application of differential, integral and vector calculus, ordinary differential equations and Laplace transforms to engineeringproblems.

The students attain the abilities to use mathematical knowledge to analyze and solve problems in engineering applications.

ECE -I YEAR

PROGRAMMING IN C AND DATA STRUCTURES

Course Objectives:

- To make the student understand problem solving techniques
- Students will be able to understand the syntax and semantics of C programming language and other features of the language
- Get acquaintance with data structures, searching and sorting techniques

Course Outcomes:

- Student can effectively apply problem solving techniques in designing the solutions for a wide-range of problems
- Student can choose appropriate data structure and control structure depending on the problem to be solved
- Student can effectively use existing data structures and design new data structures appropriate to the problem to be solved
- Student can modularize the problem and also solution
- Student can use appropriate searching and sorting technique to suit the application

Unit-I

Introductory Concepts: Introduction to computers, What is a Computer, Block diagram of Computer, Computer Characteristics, Hardware Vs Software, How to develop a program, Software development life cycle, Structured programming, Modes of operation, Types of programming languages, Introduction to C, Desirable program characteristics.

Introduction to Computer problem solving: Introduction, The problem solving aspect, Top down design, Implementation of algorithms.

Introduction to C programming: The C character set, Writing first program of C, Identifiers and key words, A more useful C program, Entering the program into the computer, Compiling and executing the program, Data types, Constants, Variables and arrays, Declarations, Expressions, Statements, Symbolic Constants.

Operators and Expressions: Arithmetic operators, Unary operators, Relational and Logical operators, Assignment operators, Conditional operator, Library functions.

Fundamental algorithms: Exchanging the values of two variables, Factorial computation, Sine function computation, Reversing the digits of an integer, Generating prime numbers.

Unit-II

Data Input and Output: Preliminaries, Single character input-getchar function, Single character output-putchar function, Entering input data-the scanf function, More about the scanf function, Writing output data-The printf function, More about the printf function, The gets and puts functions, Interactive(conversational) programming.

Preparing and running a complete C program: Planning a C program, Writing a C program, Error diagnostics, Debugging techniques.

Control statements: Preliminaries, Branching: if-else statement, Looping: The while statement, More looping: The do-while statement, Still more looping: The for statement, Nested control structures, The switch statement, Break statement, Continue statement, The comma operator, The goto statement.

Functions: A brief overview, Defining a function, Accessing a function, Function prototypes, Passing arguments to a function, Recursion

Unit-III

Program Structure: Storage classes, Automatic variables, External (global) variables, Static variables, Multi file programs, More about library functions.

Arrays: Defining an array, Processing an array, Passing arrays to functions, Multi dimensional arrays.
Array Techniques: Array order reversal, Removal of duplicates from an ordered array, Finding the K^{th} smallest element.

Merging, Sorting and Searching: The two way merge, Sorting by selection, Sorting by exchange, Sorting by insertion, Sorting by partitioning, Recursive Quick sort, Binary Search.

Strings: Defining a string, NULL character, Initialization of strings, Reading and Writing a string, Processing the strings, Character arithmetic, Searching and Sorting of strings, Some more Library functions for strings

Unit-IV

Pointers: Fundamentals, Pointer Declarations, Passing pointer to a function, Pointers and one dimensional array, Dynamic memory allocation, Operations on pointers, Pointers and multi dimensional arrays, Arrays of pointers, Passing functions to other functions, More about pointer declarations.

Structures and Unions: Defining a structure, Processing a structure, User defined data type (typedef), Structures and Pointers, Passing structures to functions, Unions.

File Handling: Why files, Opening and closing a data file, Reading and Writing a data file, Processing a data file, Unformatted data files, Concept of binary files, Accessing the file randomly (using fseek).

Additional Features: Register variables, Bitwise operations, Bit Fields, Enumerations, Command line parameters, More about Library functions, Macros, The C Preprocessor

Unit-V

Introduction to Data Structures: Data abstraction

Stacks and Queues: Stacks, Stacks using dynamic arrays, Queues, Circular Queues using dynamic arrays

Evaluations of expressions: Expressions, Evaluating postfix expressions, Infix to Postfix, Multiple Stacks and Queues.

Linked Lists: Singly Linked lists and chains, Representing chains in C, Linked Stacks and Queues.

Text Books:

1. "Programming with C", Byron Gottfried, Third Edition, Schaum's Outlines, 3rd edition, 2010, Mc Graw Hill.
2. "Fundamentals of Data Structures in C", Horowitz, Sahni, Anderson-freed, 2nd Edition, 2011, Universities Press.
3. "How to Solve it by Computer", R.G. Dromey, 14th impression, 2013, Pearson. (*Pascal implementations may be considered without loss of generality or Instructors may replace them with C language programs*)

References:

1. "Programming in C", Pradip Dey, Manas Ghosh, Oxford Higher Education
2. "Programming in C and Data Structures", Hanly, Koffman, Kamthane, Ananda Rao, Pearson.
3. "Programming in C", Reema Thareja, Oxford Higher Education.
4. "Computer Fundamentals and C Programming", First Edition, Dr.P.Chenna Reddy, Available at: www.pothi.com.
5. "Data Structure and Program Design in C", Second Edition, Kruse, Tondo, Leung, Mogalla, Pearson.
6. "Programming with C", R.S. Bichkar, University Press.
7. "Computer Science A Structured Programming Approach Using C", Third Edition, Fourouzan & Gilberg, Cengage Learning.

ECE -I YEAR

MATHEMATICS-II

Objectives:

 This course aims at providing the student with the concepts of Matrices, Fourierseries, Fourier and Z-transforms and partial differential equations which find theapplications in engineering.

 Our emphasis will be more on logical and problem solving development in Numericalmethods and their applications.

UNIT – I

Rank – Echelon form, normal form – Consistency of System of Linear equations. Lineartransformations Hermitian, Skew-Hermitian and Unitary matrices and their properties. Eigen Values, Eigenvectors for both real and complex matrices. Cayley – Hamilton Theorem and its applications– Diagonolization of matrix. Calculation of powers of matrix. Quadratic forms – Reductionof quadratic form to canonical form and their nature.

UNIT – II

Solution of Algebraic and Transcendental Equations: The Bisection Method – The Method ofFalse Position– Newton-Raphson Method.

Interpolation: Newton’s forward and backward interpolation formulae – Lagrange’sInterpolation formula.

Curve fitting: Fitting of a straight line – Second degree curve – Exponentional curve-Power curve by method of least squares. Numerical Differentiation and Integration – Trapezoidalrule – Simpson’s 1/3 Rule – Simpson’s 3/8 Rule.

UNIT – III

Numerical solution of Ordinary Differential equations: Solution by Taylor’s series-Picard’s Method of successive Approximations-Euler’s Method-Runge-Kutta Methods – Predictor-Corrector Method – Milne’s Method. Numerical solution of Laplace equation using finite difference approximation.

Fourier Series: Determination of Fourier coefficients – Fourier series – Even and odd functions – Fourier series in an arbitrary interval – Even and odd periodic continuation – Half-range Fourier sine and cosine expansions.

UNIT – IV

Fourier integral theorem (only statement) – Fourier sine and cosine integrals. Fourier transform – Fourier sine and cosine transforms – Properties – Inverse transforms – Finite Fourier transforms.

z-transform – Inverse z-transform – Properties – Damping rule – Shifting rule – Initial and final value theorems. Convolution theorem – Solution of difference equations by ztransforms.

UNIT – V

Formation of partial differential equations by elimination of arbitrary constants and arbitrary functions – Method of separation of variables – Solutions of one dimensional wave equation, heat equation and two-dimensional Laplace’s equation under initial and boundary conditions.

TEXT BOOKS:

1. Higher Engineering Mathematics, B.S.Grewal, Khanna publishers- 42 Edition(2012)
2. Introductory Methods of Numerical Analysis, S.S. Sastry, PHI publisher 5th Edition(2012)

REFERENCES:

1. Engineering Mathematics, Volume - II, E. Rukmangadachari & E. Keshava Reddy, Pearson Publisher-1st Edition (2010)
2. Engineering Mathematics, Volume - II, by G.S.S.Raju, CENGAGE publisher – 1st Edition(2013)
3. Mathematical Methods by T.K.V. Iyengar, S. Chand publication-8th Edition(2013)
4. Higher Engineering Mathematics, by B.V.Ramana, Mc Graw Hill publishers(2008)
5. Advanced Engineering Mathematics, by Erwin Kreyszig, Wiley India 10th Edition(2013)

Outcomes:

- The student becomes familiar with the application of Mathematical techniques like Fourier series, Fourier and z-transforms.
- The student gains the knowledge to tackle the engineering problems using the concepts of Partial differential equations and Numerical methods.

NETWORK ANALYSIS

Course Objectives:

To help students develop an understanding on analyzing electrical circuits using various techniques. To make the student familiarize with the fundamental concepts of coupled circuits, resonance, filters and to analyze the transient response in electric circuits.

Course Outcomes:

Upon completion of the course, students will be able to:

- To solve the electrical network using mesh and nodal analysis by applying network theorems.
- Understand the basic concepts of coupled circuits, resonance and filters and solve problems.
- Analyze transient response in AC and DC electric circuits.

UNIT I

Circuit Analysis Techniques: Voltage and Current Laws, Basic Nodal and Mesh Analysis, Network Topology-Formation of Incidence Matrix, Tie set and Cutset Matrix formation, Network Theorems-Linearity and Superposition, Reciprocity, Thevenin's, Norton's, Maximum Power Transfer, Milliman, Miller & Tellegan's Theorems. Source Transformation.

UNIT II

RL and RC Circuits: The Source free RL Circuit, The Source free RC Circuit, Properties of Exponential Response, Natural & Forced Response, RLC Circuits, Complete Response of Source free parallel RLC Circuits, Source free Series RLC Circuits. **Sinusoidal Steady State Analysis**: Characteristics of Sinusoids, Forced Response of Sinusoidal Functions, The Complex forcing Function, The Phasor, Phasor relationships for R,L, and C, Impedance, Admittance.

A.C Circuit Power Analysis: Instantaneous Power, Average Power, Effective Values of Current and Voltage, Apparent Power, Power Factor, Complex Power. **Circuit Analysis in S-Domain:** Z(S) and Y(S), Poles, Zeros and Transfer Functions, The Complex- Frequency Plane, Natural Response and the S-Plane.

UNIT III

Resonance: Introduction, Definition of 'quality factor **Q**' of inductor and capacitor, Series resonance, Bandwidth of the series resonant circuits, Parallel resonance (or anti-resonance), Conditions for maximum impedance, Currents in parallel resonance, Impedance variation with frequency; universal resonance curves, Bandwidth of parallel resonant circuits, General case of parallel resonance circuit, Anti-resonance at all frequencies, variable phase angle circuit, reactance curves, Impedance Transformation.

Magnetically Coupled Circuits: Mutual Inductance, Energy Considerations, The Linear Transformer, The Ideal Transformer

UNIT IV

Two Port Networks :Relationship of two port variables, Short circuit Admitance parameters, Open circuit Impedance parameters, Transmission Parameters, Hybrid Parameters, Relationship between parameter sets, Parallel connection of two port networks, State Variable Networks.

State Variable Analysis: Introduction to state variables – state variables of circuits, state and output equations, advantages of state variable analysis, Circuit state equations, Proper and improper circuits, Equations for proper circuits, Transform solution of state equations, Illustrative problems.

UNIT V

Filters: Introduction, the neper & decibel, Characteristic Impedance of symmetrical networks, Currents & voltage ratios as exponentials; the propagation constant, Hyperbolic trigonometry, Properties of symmetrical networks, Filter fundamentals; pass and stop bands, Behavior of characteristic impedance, The constant – k low pass filter, the constant – k high pass filter, The m-derived T section, The m-derived π section, Variation of characteristic impedance over the pass band, Termination with m-derived half sections, Band-pass filters, Band elimination filters, Illustrative problems.

TEXT BOOKS:

1. Hayt, Kemmerly and Durbin, *"Engineering Circuit Analysis,"* Tata McGraw-Hill, 6^{th} Edition, 2010.
2. John D. Ryder, *"Networks, Lines, and Fields,"* PHI publications, 2^{nd} Edition, 2012.
3. Van Valkenburg, *"Network Analysis,"* McGraw Hill, 3^{rd} Edition, 2000.

REFERENCES:

1. D. Roy Choudary, *"Network and Systems,"* New Age International, 1^{st} edition, 1998.
2. A. Sudhakaar & Shyanmugam S.Palli, *"Circuits & Network Analysis & Synthesis,"* 2^{nd} Edition, Tata McGraw Hill, 1994.
3. Franklin F. Kuo, *"Network Analysis and synthesis,"* Wiley India Pvt Ltd, 2^{nd} Edition, 2006.

ECE -I YEAR

PROGRAMMING IN C AND DATA STRUCTURE LAB

Course Objectives:

- To make the student learn C Programming language
- To make the student solve problems, implement them using C language.
- To strengthen the ability to identify and apply the suitable data structure for the given real world problem

Course Outcomes:

- Apply problem solving techniques to find solutions to problems
- Able to use C language features effectively and implement solutions using C language.
- Be capable to identity the appropriate data structure for a given problem or application.
- Improve logical skills

List of Experiments/Tasks

1. Practice DOS and LINUX Commands necessary for design of C Programs.
2. Study of the Editors, Integrated development environments, and Compilers in chosen platform.
3. Write, Edit, Debug, Compile and Execute Sample C programs to understand the programming environment.
4. Practice programs: Finding the sum of three numbers, exchange of two numbers, maximum of two numbers, to read and print variable values of all data types of C language, to find the size of all data types, to understand the priority and associativity of operators using expressions, to use different library functions of C language.
5. Write a program to find the roots of a quadratic equation.
6. Write a program to compute the factorial of a given number.
7. Write a program to check whether the number is prime or not.
8. Write a program to find the series of prime numbers in the given range.
9. Write a program to generate Fibonacci numbers in the given range.
10. Write a program to find the maximum of a set of numbers.
11. Write a program to reverse the digits of a number.
12. Write a program to find the sum of the digits of a number.
13. Write a program to find the sum of positive and negative numbers in a given set of numbers.
14. Write a program to check for number palindrome.
15. Write a program to evaluate the sum of the following series up to 'n' terms $e^x=1+x+x^2/2!+x^3/3!+x^4/4!+$---------
16. Write a program to generate Pascal Triangle.
17. Write a program to read two matrices and print their sum and product in the matrix form.
18. Write a program to read matrix and perform the following operations.
    i. Find the sum of Diagonal Elements of a matrix.
    ii. Print Transpose of a matrix.
    iii. Print sum of even and odd numbers in a given matrix.
19. Write a program to accept a line of characters and print the count of the number of Vowels, Consonants, blank spaces, digits and special characters.
20. Write a program to insert a substring in to a given string and delete few characters from the string. Don't use library functions related to strings.

21. Write a program to perform the operations addition, subtraction, multiplication of complex numbers.
22. Write a program to split a ‘file’ in to two files, say file1 and file2. Read lines into the ‘file’ from standard input. File1 should consist of odd numbered lines and file2 should consist of even numbered lines.
23. Write a program to merge two files.
24. Write a program to implement numerical methods Lagrange’s interpolation, Trapezoidal rule.
25. Write a program to read a set of strings and sort them in alphabetical order.
26. Write a program to sort the elements of an array using sorting by exchange.
27. Write a program to sort the elements of an array using Selection Sort.
28. Write a program to perform Linear Search on the elements of a given array.
29. Write a program to perform Binary Search on the elements of a given array.
30. Write a program to find the number of occurrences of each number in a given array of numbers.
31. Write a program to read two strings and perform the following operations without using built-in string Library functions and by using your own implementations of functions.
    i. String length determination ii .Compare Two Strings
    iii. Concatenate them, if they are not equal iv. String reversing
32. Write programs using recursion for Factorial of a number, GCD, LCM, Towers of Hanoi.
33. Write a program to convert infix expression to postfix expression and evaluate postfix expression.
34. Write a program to exchange two numbers using pointers.
35. Write a program to implement stack, queue, circular queue using array and linked lists.
36. Write a program to perform the operations creation, insertion, deletion, and traversing a singly linked list
37. Write a program to read student records into a file. Record consists of rollno, name and marks of a student in six subjects and class. Class field is empty initially. Compute the class of a student. The calculation of the class is as per JNTUA rules. Write the first class, second class, third class and failed students lists separately to another file.
38. A file consists of information about employee salary with fields employeeid, name, Basic, HRA, DA, IT, other-deductions, Gross and Net salary. Initially only employeeid, name, and basic have valid values. HRA is taken as 10% of the basic, DA is taken as 80% of basic, IT is 20% of the basic, other deductions is user specified. Compute the Gross and Net salary of the employee and update the file.
39. Write a program to perform Base (decimal, octal, hexadecimal, etc) conversion.
40. Write a program to find the square root of a number without using built-in library function.
41. Write a program to convert from string to number.
42. Write a program to generate pseudo random generator.
43. Write a program to remove duplicates from ordered and unordered arrays.
44. Write a program to sort numbers using insertion sort.
45. Write a program to implement quick sort using non-recursive and recursive approaches. Use randomized element as partitioning element.
46. Write a program to search a word in a given file and display all its positions.
47. Write a program to generate multiplication tables from 11 to 20.
48. Write a program to express a four digit number in words. For example 1546 should be written as one thousand five hundred and forty six.

49. Write a program to generate a telephone bill. The contents of it and the rate calculation etc should be as per BSNL rules. Student is expected to gather the required information through the BSNL website.
50. Write a program for tic-tac-toe game.
51. Write a program to find the execution time of a program.
52. Design a file format to store a person's name, address, and other information. Write a program to read this file and produce a set of mailing labels

Note: The above list consists of only sample programs. Instructors may choose other programs to illustrate certain concepts, wherever is necessary. Programs should be there on all the concepts studied in the Theory on C programming and Data structures. Instructors are advised to change atleast 25% of the programs every year until the next syllabus revision.

References:

4. "Programming with C", Byron Gottfried, Third Edition, Schaum's Outlines, Mc Graw Hill.
5. "Fundamentals of Data Structures in C", Horowitz, Sahni, Anderson-freed, Second Edition, Universities Press.
6. "How to Solve it by Computer", R.G. Dromey, Pearson.
7. "The C Programming Language", Brian W. Kernighan, Dennis M. Ritchie, Pearson.
8. "Classic Data Structures", Samantha, PHI
9. "Let us C", Yeswant Kanetkar, BPB publications
10. "Pointers in C", Yeswant Kanetkar, BPB publications

ECE -I YEAR

ENGINEERING PHYSICS LAB

(Common to all branches)

PREAMBLE:

By performing the experiments engineering students acquire the knowledge about the importance of the studied theoretical physical concepts.

LAB OBJECTIVE:

- Will understand the role of optical fiber parameters and signal losses in communication.
- Will recognize the importance of energy gap in the study of conductivity and hall effect in a semiconductor
- Will understand the applications of B H curve.
- Will acquire a practical knowledge of studying the crystal structure in terms of lattice constant.
- Will recognize the significance of laser by studying its characteristics and its application in finding the particle size.
- Will learn to synthesis of the nanomaterials and recognize its importance by knowing its nano particle size and its impact on its properties.

Any 10 of the following experiments has to be performed during the academic year

1. Determination of radius of curvature of a lens by forming Newton's rings.
2. Determination of wavelength of various colours of mercury spectrum using diffraction grating in normal incidence method.
3. Determination of Numerical aperture, acceptance angle and losses of an optical fiber.
4. Energy gap of a material using p-n junction diode.
5. Hall effect – Determination of mobility of charge carriers.
6. B-H curve – Determination of hysteresis loss.
7. Determination of lattice constant using X-ray spectrum.
8. Determination of particle size by using laser source.
9. Determination of dielectric constant.
10. Study of Laser characteristics.
11. Synthesis of nanomaterial by sol-gel method.
12. Particle size analysis of the synthesized nanomaterials.

LAB OUTCOMES:

- Would have acquired the practical application knowledge of optical fiber, semiconductor, dieclectric and magnetic materials, crystal structure and lasers by the study of their relative parameters.
- Would recognize the significant importance of nanomaterials in various engineering fields.

ECE -I YEAR

ENGINEERING CHEMISTRY LAB

Preamble: The experiments are designed in a manner that the students can validate their own theory understanding in chemistry by self involvement and practical execution. Thus the execution of these experiments by the student will reinforce his/her understanding of the subject and also provide opportunity to refine their understanding of conceptual aspects. As a result, the student gets an opportunity to have felt good factor at the laboratory bench about the chemical principles that he/she learned in the classroom.

Programme Objective:

- Will learn practical understanding of the redox reaction
- Will able to understand the function of fuel cells, batteries and extend the knowledge to the processes of corrosion and its prevention
- Will learn the preparation and properties of synthetic polymers and other material that would provide sufficient impetus to engineer these to suit diverse applications
- Will also learn the hygiene aspects of water would be in a position to design methods to produce potable water using modern technology

LIST OF EXPERIMENTS

1. Determination of total hardness of water by EDTA method.
2. Determination of Copper by EDTA method.
3. Estimation of Dissolved Oxygen by Winkler's method
4. Determination of Manganese by colorimetry.
5. Estimation of iron (II) using diphenylamine indicator (Dichrometry – Internal indicator method).
6. Determination of Alkalinity of Water
7. Determination of acidity of Water
8. Preparation of Phenol-Formaldehyde (Bakelite)
9. Determination of Viscosity of oils using Redwood Viscometer I
10. Determination of Viscosity of oils using Redwood Viscometer II
11. Conductometric titration of strong acid Vs strong base (Neutralization titration).
12. Conductometric titration of Barium Chloride vs Sodium Sulphate (Precipitation Titration)
13. Determination of Corrosion rate and inhibition efficiency of an inhibitor for mild steel in hydrochloric acid medium.
14. Estimation of Chloride ion using potassium Chromate indicator (Mohrs method)
15. Acid-Base neutralisation by pH method.

(Any 10 experiments from the above list)

Course Outcomes

- **Would be confident in handling energy storage systems and would be able combat chemical corrosion**
- **Would have acquired the practical skill to handle the analytical methods with confidence.**
- **Would feel comfortable to think of design materials with the requisite properties**
- **Would be in a position to technically address the water related problems.**

TEXT BOOKS:

1. Vogel's Text book of Quantitative Chemical Analysis, J. Mendham et al, Pearson Education, Sixth Edition, 2012.

2. Chemistry Practical – Lab Manual by K.B.Chandra Sekhar, G.V. Subba Reddy and K.N.Jayaveera, SM Publications, Hyderabad, 3rd Edition, 2012.

ECE -I YEAR

Engineering &IT Workshop(13ACS03)
ENGINEERING WORKSHOP

Course Objective:

- *The objective of this Lab is to provide the basic concepts about different manufacturing processes, use of various workshops tools and exposer to the power tools.*
- *Identify and use marking out tools, hand tools, measuring equipment and to work to prescribed tolerances.*

TRADES FOR EXERCISES:

At least 2 exercise in each:

1. Carpentry
2. Fitting
3. House-wiring
4. Foundry
5. Tin smithy
6. Power Tools Demonstration.

TEXT BOOK:

1. Work shop Manual / P.Kannaiah/ K.L.Narayana/Scitech Publishers.
2. Workshop practice manual by K.Venkata Reddy B.S Publications

Codes / Tables : will be provided

Question Paper pattern: Test in any two trades out of 6 trades.

Course outcomes

- *Workshop practice is the backbone of the real industrial environment which helps to develop and enhance relevant technical hand skills required by the technician working in the various engineering industries and workshops.*
- *This course intends to impart basic know-how of various hand tools and their use in different sections of manufacturing.*
- *Irrespective of branch, the use of workshop practices in day to day industrial as well domestic life helps to dissolve the problems.*
- *Workshop curricula build the hands on experiences which would help to learn manufacturing processes and production technology courses in successive semesters.*
- *Workshop practice is also important since only practice can make the man perfect.*

IT Workshop

Course Objectives:

- To provide Technical training to the students on Productivity tools like Word processors, Spreadsheets, Presentations
- To make the students know about the internal parts of a computer, assembling a computer from the parts, preparing a computer for use by installing the operating system
- To learn about Networking of computers and use Internet facility for Browsing and Searching

Course Outcomes:

- Disassemble and Assemble a Personal Computer and prepare the computer ready to use
- Prepare the Documents using Word processors
- Prepare Slide presentations using the presentation tool
- Interconnect two or more computers for information sharing
- Access the Internet and Browse it to obtain the required information
- Install single or dual operating systems on computer

Preparing your Computer (5 weeks)

Task 1: Learn about Computer: Identify the internal parts of a computer, and its peripherals. Represent the same in the form of diagrams including Block diagram of a computer. Write specifications for each part of a computer including peripherals and specification of Desktop computer. Submit it in the form of a report.

Task 2: Assembling a Computer: Disassemble and assemble the PC back to working condition. Students should be able to trouble shoot the computer and identify working and non-working parts. Student should identify the problem correctly by various methods available (eg: beeps). Students should record the process of assembling and trouble shooting a computer.

Task 3: Install Operating system: Student should install Linux on the computer. Student may install another operating system (including proprietary software) and make the system dual boot or multi boot. Students should record the entire installation process.

Task 4: **Operating system features**: Students should record the various features that are supported by the operating system(s) installed. They have to submit a report on it. Students should be able to access CD/DVD drives, write CD/DVDs, access pen drives, print files, etc. Students should install new application software and record the installation process.

Networking and Internet (4 weeks)

Task 5:Networking: Students should connect two computers directly using a cable or wireless connectivity and share information. Students should connect two or more computers using switch/hub and share information. Crimpling activity, logical configuration etc should be done by the student. The entire process has to be documented.

Task 6:Browsing Internet: Student should access the Internet for Browsing. Students should search the Internet for required information. Students should be able to create e-mail account and send email. They should get acquaintance with applications like Facebook, skype etc.

If Intranet mailing facility is available in the organization, then students should share the information using it. If the operating system supports sending messages to multiple users (LINUX supports it) in the same network, then it should be done by the student. Students are expected to submit the information about different browsers available, their features, search process using different natural languages, and creating e-mail account.

Task 7: Antivirus: Students should download freely available Antivirus software, install it and use it to check for threats to the computer being used. Students should submit information about the features of the antivirus used, installation process, about virus definitions, virus engine etc.

Productivity tools (6 weeks)

Task 8: Word Processor: Students should be able to create documents using the word processor tool. Some of the tasks that are to be performed are inserting and deleting the characters, words and lines, Alignment of the lines, Inserting header and Footer, changing the font, changing the colour, including images and tables in the word file, making page setup, copy and paste block of text, images, tables, linking the images which are present in other directory, formatting paragraphs, spell checking, etc. Students should be able to prepare project cover pages, content sheet and chapter pages at the end of the task using the features studied. Students should submit a user manual of the word processor considered.

Task 9: Spreadsheet: Students should be able to create, open, save the application documents and format them as per the requirement.Some of the tasks that may be practiced are Managing the worksheet environment, creating cell data, inserting and deleting cell data, format cells, adjust the cell size, applying formulas and functions, preparing charts, sorting cells. Students should submit a user manual of the Spreadsheet application considered.

Task 10: Presentations : creating, opening, saving and running the presentations, Selecting the style for slides, formatting the slides with different fonts, colours, creating charts and tables, inserting and deleting text, graphics and animations, bulleting and numbering, hyperlinking, running the slide show, setting the timing for slide show. Students should submit a user manual of the Presentation tool considered.

Optional Tasks:

Task 11: Laboratory Equipment: Students may submit a report on specifications of various equipment that may be used by them for the laboratories in their curriculum starting from I B.tech to IV. B.Tech. It can vary from department to department. Students can refer to their syllabus books, consult staff members of the concerned department or refer websites. The following is a sample list. Instructors may make modifications to the list to suit the department concerned.

- Desktop computer
- Server computer
- Switch (computer science related)
- Microprocessor kit
- Micro controller kit
- Lathe machine
- Generators
- Construction material
- Air conditioner
- UPS and Inverter
- RO system
- Electrical Rectifier
- CRO
- Function Generator
- Microwave benches

Task 12: Software: Students may submit a report on specifications of various software that may be used by them for the laboratories in their curriculum starting from I B.tech to IV. B.Tech. The software may be proprietary software or Free and Open source software. It can vary from department to department. Students can refer to their syllabus books, consult staff members of the concerned department or refer websites. The following is a sample list. Instructors may make modifications to the list to suit the department concerned.

- Desktop operating system
- Server operating system
- Antivirus software
- MATLAB
- CAD/CAM software
- AUTOCAD

References:

1. "Introduction to Computers", Peter Norton, Mc Graw Hill
2. "LaTeX Companion" – Leslie Lamport, PHI/Pearson.
3. "MOS study guide for word, Excel, Powerpoint & Outlook Exams", Joan Lambert, Joyce Cox, PHI.
4. "Introduction to Information Technology", ITL Education Solutions limited, Pearson Education.
5. "Networking your computers and devices", Rusen, PHI
6. "Trouble shooting, Maintaining & Repairing PCs", Bigelows, TMH.

ECE -I YEAR

English Language & Communication Skills Lab

The **Language Lab** focuses on the production and practice of sounds of language and familiarizes the students with the use of English in everyday situations and contexts.

OBJECTIVES:

- To train students to use language effectively in everyday conversations, to participate in group discussions, to help them face interviews, and sharpen public speaking skills
- To expose the students to a varied blend of self-instructional learner-friendly modes of language learning through computer-aided multi-media instruction.
- To enable them to learn better pronunciation through stress on word accent, intonation, and rhythm.
- To help the second language learners to acquire fluency in spoken English and neutralize mother tongue influence
- To train students to use language appropriately for interviews, group discussion and public speaking

SYLLABUS:

Unit-1

1. Phonetics -importance
2. Introduction to Sounds of Speech
3. Vowels sounds
4. Consonants sounds
5. Phonetic Transcription

Unit-2

6. Word Stress
7. Syllabification
8. Rules of word stress
9. Intonation
10. Falling
11. Rising Tone
12. Fall rise tones

Unit-3

Situational Dialogues

13. Role Plays
14. JAM
15. Describing people/object/place
16. Stage dynamics
17. Body language

Unit-4

18. Debates
19. Group Discussions
20. Interview skills
21. Telephone skills
22. Public Speaking
23. Preparation of resume

Unit-5

24. Basics of Communication Skills
25. Objectives & Characteristics of Communication
26. LSRW Skills –
27. Presentation Skills

EXPECTED OUTCOMES:

- Becoming active participants in the learning process and acquiring proficiency in spoken English of the students
- Speaking with clarity and confidence thereby enhancing employability skills of the students

MINIMUM REQUIREMENT FOR ELCS LAB:

The English Language Lab shall have two parts:

1. Computer Assisted Language Learning (CALL) Lab:
   The Computer aided Language Lab for 60 students with 60 systems, one master console, LAN facility and English language software for self- study by learners.

2. The Communication Skills Lab with movable chairs and audio-visual aids with a P.A. system, Projector, a digital stereo-audio & video system and camcorder etc.

System Requirement (Hardware component):
Computer network with Lan with minimum 60 multimedia systems with the following specifications:

i) P – IV Processor
   a) Speed – 2.8 GHZ
   b) RAM – 512 MB Minimum
   c) Hard Disk – 80 GB

ii) Headphones of High quality

SUGGESTED SOFTWARE:

1. Clarity Pronunciation Power – Part I (Sky Pronunciation)
2. Clarity Pronunciation Power – part II
3. K-Van Advanced Communication Skills
4. TOEFL & GRE (KAPLAN, AARCO & BARRONS, USA, Cracking GRE by CLIFFS)
5. *DELTA's key to the Next Generation TOEFL Test: Advanced Skill Practice.*
6. Lingua TOEFL CBT Insider, by Dreamtech
7. English Pronunciation in Use (Elementary, Intermediate, Advanced) CUP
8. Cambridge Advanced Learners' English Dictionary with CD.
9. Oxford Advanced Learner's Compass, 8th Edition
10. Sanjay Kumar & Pushp Lata. 2011. Communication Skills, OUP

REFERENCE BOOKS:

1. **A Textbook of English Phonetics for Indian Students** 2nd Ed T. Balasubramanian. (Macmillian),2012.
2. **A Course in Phonetics and Spoken English**, Dhamija Sethi, Prentice-Hall of India Pvt.Ltd
3. **Strengthen Your Steps,** Maruthi Publicaions, 2012.
4. **Speaking English Effectively**, 2nd Edition Krishna Mohan & NP Singh, 2011. (Mcmillan).
5. **Listening in the Language Classroom**, John Field (Cambridge Language Teaching Library),2011
6. **A Hand book for English Laboratories**, E.Suresh kumar, P.Sreehari, Foundation Books,2011
7. **English Pronunciation in Use. Intermediate & Advanced** ,Hancock, M. 2009. CUP
8. **Basics of Communication in English** ,Soundararaj, Francis. 2012.. *New Delhi: Macmillan*
9. **Spoken English** (CIEFL) in 3 volumes with 6 cassettes, OUP.

English Pronouncing Dictionary, Daniel Jones Current Edition with CD.Cambridge, 17th edition, 2011.

II Year B.Tech - I Semester

Engineering Drawing
(CSE, ECE & EEE)

Course Objectives:

- *To impart and inculcate proper understanding of the theory of projection.*
- *To improve the visualization skills.*
- *To enable the students with various concepts like dimensioning, conventions and standards related to working drawings in order to become professionally efficient.*
- *To impart the knowledge on understanding and drawing of simple residential/office buildings.*

Unit-I

Introduction to Engineering Drawing: Principles of Engineering Graphics and their significance; Drawing Instruments and their Usage – BIS Conventions in drawing and Lettering.

Curves used in engineering practice:

a) Conic sections including Rectangular Hyperbola
b) Cycloid, Epicycloid and Hypocycloid –Normals and Tangents
c) Involute of a circle –Normals and Tangents

Unit –II

Principles of orthographic projection in I and III angle projections –Conventions & dimensions – Projections of points. Projection of lines inclined to both planes –traces,

Unit –III

Projection of planes inclined to both planes. Projection of regular solids inclined to both planes.

Unit –IV

Conversion of Pictorial views to orthographic views –Conventions.

Unit –V

Isometric projections: Principles of pictorial representations-Isometric projection- Isometric scale-Isometric views- conventions- Isometric views of plane figures, solids-Isometric projection of objects with non isometric lines.

TEXT BOOKS:

1. Engineering Drawing, N.D. Bhat, Charotar Publishers
2. Engineering Drawing, Shah and Rana, 2/e, Pearson Education
3. Engineering Drawing, K.L. Narayana, P. Khanniah, Scitech Pub.

REFERENCES:

1. Engineering Drawing and Graphics, Venugopal/ New age
2. Engineering Drawing, B.V.R. Gupta, J.K. Publishesrs
3. Engineering Drawing, Johle, Tata McGraw-Hill
4. Engineering Drawing, K.Venkata Reddy, B.S.Publishers.

Course Outcomes:

- *Students will be able to improve their visualization skills so that they can apply these skills in developing new products.*
- *Students will be able to prepare simple layout of factory buildings.*

Students will be able to know and understand the conventions and the methods of engineering drawing.

II Year B.Tech - I Semester

ELECTRONIC DEVICES AND CIRCUITS

Course Objectives:

To give understanding on semiconductor physics of the intrinsic, p and n materials, characteristics of the p-n junction diode, diode's application in electronic circuits, Characteristics of BJT,FET,MOSFET, characteristics of special purpose electronic devices. To familiarize students with dc biasing circuits of BJT, FET and analyzing basic transistor amplifier circuits.

Course Outcomes:

Upon completion of the course, students will:

- Analyze the operating principles of major electronic devices, its characteristics and applications.
- Design and analyze the DC bias circuitry of BJT and FET.
- Design and analyze basic transistor amplifier circuits using BJT and FET.

UNIT- I

PN JUNCTION DIODE & ITS APPLICATIONS:

Review of semi conductor Physics n and p –type semi conductors, Mass Action Law, Continuity Equation, Hall Effect, Fermi level in intrinsic and extrinsic semiconductors, PN Diode Equation, Volt-Ampere (V-I) Characteristics, Temperature Dependence of V-I Characteristics, Ideal Versus Practical Static and Dynamic Resistances, Diode Equivalent circuits, Break down Mechanisms in semiconductor Diodes, Zener Diode Characteristics. PN Junction as a Rectifier, Half wave rectifier, ripple factor, full wave rectifier, Bridge Rectifier, Harmonic components in a rectifier circuit, Inductor filter, Capacitor filter, L- section filter, Π- section filter, Use of Zener Diode as a Regulator, Illustrative problems.

UNIT- II

TRANSISTOR AND FET CHARECTERISTICS: Transistor construction, BJT Operation, BJT Symbol, Transistor as an Amplifier, Common Emitter, Common Base and Common Collector Configurations, Limits of Operation, BJT Specifications, The Junction Field Effect Transistor (Construction, Principle of Operation, Symbol) - Pinch-Off Voltage – Volt-Ampere Characteristics, FET as Voltage Variable Resistor, Comparison between BJT and FET, MOSFET- Basic Concepts, Construction, modes(depletion & enhancement), symbol, principle of operation, characteristics.

UNIT-III

BIASING AND STABILISATION: Operating Point, DC and AC Load Lines, Importance of Biasing, Fixed Bias, Collector to Base Bias, Self Bias, Bias Stability, Stabilization against Variations in $I_{CO}V_{BE}$ and β, Bias Compensation Using Diodes and Transistors, Thermal Runaway, Condition for Thermal Stability in CE configuration, Biasing of FET – Source self bias, Biasing for zero current Drift, Biasing against Devices variation, Illustrative problems.

UNIT- IV

SMALL SIGNAL ANALYSIS OF AMPLIFIERS (BJT & FET):

BJT Modeling using h-parameters, Determination of h-Parameters from Transistor Characteristics, Measurement of h-Parameters, Analysis of CE, CB and CC configurations using h-Parameters, Comparison of CB, CE and CC configurations, Simplified Hybrid Model, Millers Theorem, Dual of Millers Theorem. Small Signal Model of JFET & MOSFET, Small signal analysis of Common Source, and Common Drain Amplifiers using FET, Illustrative problems.

UNIT-V

SPECIAL PURPOSE ELECTRONIC DEVICES:

Principle of Operation, and Characteristics of Tunnel Diode, Varactor Diode, Schottky Barrier Diode, Silicon Control Rectifier, Diac, Triac & Uni-Junction Transistor (UJT),Semiconductor photo devices - LDR, LED, Photo diodes & Photo transistors.

TEXT BOOKS:

1. J.Millman and Christos.C.Halkias, Satyabrata, *"Electronic Devices and Circuits,"* Tata McGraw Hill, 3rd edition, 2012.
2. R.L. Boylestad, *"Introductory Circuit Analysis,"* Pearson Publications, 12th edition, 2013.
3. K. Lal kishore, *"Electronic Devices and Circuits,"* B.S. Publications, 2nd edition, 2005.

REFERENCES:

1. B.P.Singh and Rekha Singh, *"Electronic Devices and Circuits,"* Pearson Educations, 2nd Edition 2013.
2. David A. Bell, *"Electronic Devices and Circuits,"* Oxford University Press, 5th Edition, 2008.
3. Mohammad H.Rashid, *"Microelectronics Circuits: Analysis & Design,"* Cengage Learning, 2011.
4. N.Salivahanan, and N.Suresh Kumar, *"Electronic Devices and Circuits,"* Tata McGraw Hill, 3rd Edition 2012.
5. A. S. Sedra and K. C. Smith, *"Microelectronic Circuits,"* Oxford University Press, 5th Edition, 2004.

II Year B.Tech - I Semester

SIGNALS AND SYSTEMS

Objectives:

- To study about signals and systems.
- To do analysis of signals & systems (continuous and discrete) using time domain &frequency domain methods.
- To understand the stability of systems through the concept of ROC.
- To know various transform techniques in the analysis of signals and systems.

Learning Outcomes:

- For integro-differential equations, the students will have the knowledge to make use of Laplace transforms.
- For continuous time signals the students will make use of Fourier transform and Fourier series.
- For discrete time signals the students will make use of Z transforms.
- The concept of convolution is useful for analysis in the areas of linear systems and communication theory.

UNIT - I

Signals and Systems: Continuous-Time and Discrete-Time Signals, Transformations of the Independent Variable, Exponential and Sinusoidal Signals, the Unit Impulse and Unit Step Functions, Continuous-Time and Discrete-Time Systems, Basic System Properties, Linear Time-Invariant Systems - Discrete-Time LTI Systems, The Convolution Sum, Continuous-Time LTI Systems - The Convolution Integral, Properties of Linear Time-Invariant Systems, Causal LTI Systems Described by Differential and Difference Equations, Singularity Functions.

UNIT-II

Fourier Series Representation of Periodic Signals: The Response of LTI Systems to Complex Exponentials. Fourier Series Representation of Continuous-Time Periodic Signals, Convergence of the Fourier Series, Properties of Continuous-Time Fourier Series, Fourier Series Representation of Discrete-Time Periodic Signals, Properties of Discrete-Time Fourier Series, Fourier Series and LTI Systems, Filtering - Examples of Continuous-Time Filters Described by Differential Equations, Examples of Discrete-Time Filters Described by Difference Equations.

UNIT-III

The Continuous-Time Fourier Transform: Representation of Aperiodic Signals, The Continuous-Time Fourier Transform, The Fourier Transform for Periodic Signals, Properties of the Continuous-Time Fourier Transform, The Convolution Property, Fourier Properties and Basic Fourier Transform Pairs, Systems characterized by Linear constant coefficient differential equations, The Discrete-Time Fourier Transform - Representation of Aperiodic Signals, The Discrete-Time Fourier Transform, The Convolution Property, Fourier Transform Properties and Basic Fourier Transform Pairs, Duality, Systems Characterized by Linear Constant-Coefficient Difference Equations.

UNIT-IV

Time & Frequency Characterization of Signals and Systems: The Magnitude-Phase Representation of the Fourier Transform, The Magnitude-Phase Representation of the Frequency Response of LTI Systems, Time-Domain Properties of Ideal Frequency-Selective Filters, Time- Domain and Frequency-Domain Aspects of Non-ideal Filters, First-Order and Second-Order Continuous-Time Systems, First-Order and Second-Order Discrete-Time Systems, Examples of Time- and Frequency-Domain Analysis of Systems, **Sampling**: Representation of a Continuous-Time Signal by Its Samples - Sampling Theorem, Reconstruction of a Signal from Its Samples Using Interpolation. Effect of under sampling: Aliasing, Discrete-Time Processing of Continuous-Time Signals.

UNIT-V

Laplace and z-Transforms: The Laplace Transform. The Region of Convergence for Laplace Transforms, The Inverse Laplace Transform, Geometric Evaluation of the Fourier Transform from the Pole-Zero Plot, Properties of the Laplace Transform, Some Laplace Transform Pairs, Analysis and Characterization of LTI Systems Using the Laplace Transform, System Function Algebra and Block Diagram Representations, Unilateral Laplace Transform, The Z-Transform - Region of Convergence for the z-Transform, The Inverse z-Transform, Geometric Evaluation of the Fourier Transform from the Pole-Zero Plot, Properties of the z-Transform, Some Common z-Transform Pairs, Analysis and Characterization of LTI Systems Using z-Transforms, System Function Algebra and Block Diagram Representations, Unilateral z-Transforms.

TEXT BOOKS:

1. Alan V. Oppenheim, Alan S. Willsky, & S. Hamid, *“Signals and Systems,”* Pearson Higher Education, 2nd Edition, 1997.
2. B.P. Lathi, *“Principles of Linear Systems and Signals,”* Oxford University Press, 2nd Edition (International version), 2009.

REFERENCES:

1. Simon Haykin and B. Van Veen, *“Signals & Systems,”* John Wiley, 2nd Edition, 2003.
2. Luis F. Chaparro, *“Signals and Systems using MATLAB,”* Academic Press, 2011.
3. Narayana Iyer, *“Signals and Systems,”* Cengage Learning, 1st Edition, 2011.
4. Michel J. Robert, *“Fundamentals of Signals and Systems,”* McGraw Hill International Edition, 2008.
5. C. L. Philips, J. M. Parr and Eve A. Riskin, *“Signals, Systems and Transforms,”* Pearson Education, 4th Edition, 2008.

II Year B.Tech - I Semester

SWITCHING THEORY AND LOGIC DESIGN

Course Objectives:

To provide fundamental concepts used in the design of digital systems and learn the methods for the design of digital circuits.

Course Outcomes:

- To introduce basic postulates of Boolean algebra and the methods for simplifying Boolean expressions
- To illustrate the concepts and study the procedures for the analysis and design of combinational circuits and sequential circuits
- To introduce the concepts of programmable logic devices.

UNIT I

NUMBER SYSTEM & BOOLEAN ALGEBRA

Digital Stytems, Binary Numbers, Number base conversions, Complements of numbers, Signed binary numbers, Binary codes. Boolean Algebra-Basic definition, Basic theorems and properties, Boolean Functions, Canonical & Standard forms, Other logic operations & Logic gates.

UNIT I

GATE LEVEL MINIMIZATION

The map method, four variable, K-map, Five variable map, POS & SOP Simplification, Don't care conditions, NAND & NOR Implementation, Other two level Implementation, Ex-or Function, Tabular Method- Simplification of Boolean function using tabulation Method.

UNIT III

ANALYSIS AND SYNTHESIS OF COMBINATIONAL CIRCUITS:

Combinational circuits, Analysis & Design procedure, Binary Adder-Subtractor, Decimal Adder, Binary Multiplier, Magnitude comparator, Decoder, Encoders, Multiplexers.

UNIT IV

ANALYSIS AND SYNTHESIS OF SEQUNTIAL CIRCUITS:

Sequential Circuits, Latches Flips-Flops, Analysis of Clocked sequential circuits, State Reduction & Assignment, Design procedure, Registers & Counters – Registers, Shift Registers, Ripple Counters, Synchronous counters, other counters.

UNIT V

Asynchronous sequential Logic & Programmable Memories

Introduction, Analysis Procedure, Circuits with Latches, Design Procedure, Reduction of State flow tables, Race-free State Assignment, Hazards. Random Access Memory, Memory Decoding Errordetection and correction, ROM,PLA, PAL.

TEXT BOOKS:

1. M.Morris Mano & Michel D. Ciletti, *"Digital Design,"* Pearson Higher Education, 5th Edition, 2012
2. Zvi KOhavi and Nirah K.Jha, *"Switching theory and Finite Automata Theory,"* Cambridge, 3rd Edition,

REFERENCES

1. Subratha Goshal, *"Digital Electronics,"* Cengage Learning, 1st Edition, 2012.
2. Comer and David J, *"Digital Logic and State Machine Design,"* Oxford University Press, 3rd Indian Edition, 1994.

II Year B.Tech - I Semester

ELECTRICAL TECHNOLOGY

UNIT _I : DC GENERATORS

D.C. Generators – Principle of Operation – Action of Commutator – Constructional Features – Armature Windings – Lap and Wave Windings- E. M.F Equation– Numerical Problems - Methods of Excitation – Separately Excited and Self Excited Generators – Build-Up of E.M.F - Critical Field Resistance and Critical Speed - Causes for Failure to Self Excite and Remedial Measures-Load Characteristics of Shunt, Series and Compound Generators.

UNIT _II : DC MOTORS

D.C Motors – Principle of Operation – Back E.M.F.– Torque Equation – Characteristics and Application of Shunt, Series and Compound Motors- Speed Control of D.C. Motors: Armature Voltage and Field Flux Control Methods- Motor Starters (3 Point and 4 Point Starters)- Losses – Constant & Variable Losses – Calculation of Efficiency – Condition for Maximum Efficiency. Methods of Testing – Direct, Indirect – Brake Test – Swinburne's Test.

UNIT _III : TRANSFORMERS

Single Phase Transformers-Types - Constructional Details--Emf Equation - Operation on No Load and on Load - Phasor Diagrams - Equivalent Circuit - Losses and Efficiency-Regulation - OC and SC Tests - Sumpner's Test - Predetermination of Efficiency and Regulation-Separation of Losses Test- Auto Transformers-Equivalent Circuit.

UNIT _IV: INDUCTION MOTORS AND ALTERNATORS

Induction Motors-Construction Details – Principle of operation - Rotor Power Input, Rotor Copper Loss and Mechanical Power Developed and Their Inter Relation – torque –slip characteristics – simple problems. Principle and operation of alternator - Pitch, Distribution, Winding Factors – E.M.F Equation-Principle and operation of synchronus motors.

UNIT – V SINGLE PHASE AND SPECIAL MOTORS

Single Phase Induction Motor - Constructional Features – Double Revolving Field Theory- Elementary Idea of Cross Field Theory – Split Phase Motors – Capacitor Start and Run Motors – Shaded Pole Motor. Principle And Performance of A.C Series Motor - Universal Motor – Single Phase Synchronous Motors – Reluctance Motor – Hysteresis Motor – Stepper Motor.

Text books:

Electrical Machines – by P.S. Bimbra, Khanna Publishers

Principles of Electrical Engineering – By Ashfaq Hussian, Dhanapat Roy & Sons

II Year B.Tech - I Semester

HUMAN VALUES AND PROFESSIONAL ETHICS

OBJECTIVE

• To create an awareness on Engineering Ethics and Human Values.

• To instill Moral and Social Values and Loyalty

• To appreciate the rights of Others

Unit I: HUMAN VALUES

Morals, Values and Ethics-Integrity-Work Ethic-Service learning – Civic Virtue – Respect for others – Living Peacefully – Caring – Sharing – Honesty - Courage- Co Operation – Commitment – Empathy – Self Confidence Character – Spirituality.

Unit II: ENGINEERING ETHICS

Senses of 'Engineering Ethics- Variety of moral issued – Types of inquiry – Moral dilemmas – Moral autonomy –Kohlberg's theory- Gilligan's theory- Consensus and controversy – Models of professional roles- Theories about right action- Self interest - Customs and religion –Uses of Ethical theories – Valuing time –Co operation – Commitment.

Unit III :ENGINEERING AS SOCIAL EXPERIMENTATION

Engineering As Social Experimentation – Framing the problem – Determining the facts – Codes of Ethics – Clarifying Concepts – Application issues – Common Ground - General Principles – Utilitarian thinking respect for persons.

UNIT IV: ENGINEERS RESPONSIBILITY FOR SAFETY AND RISK

Safety and risk – Assessment of safety and risk – Risk benefit analysis and reducing risk- Safety and the Engineer- Designing for the safety- Intellectual Property rights(IPR).

UINIT V: GLOBAL ISSUES

Globalization – Cross culture issues- Environmental Ethics – Computer Ethics – Computers as the instrument of Unethical behavior – Computers as the object of Unethical acts – Autonomous Computers- Computer codes of Ethics – Weapons Development - Ethics and Research – Analyzing Ethical Problems in research – Intellectual property Rights(IPR).

BOOKS FOR REFERENCE

1. **Engineering Ethics includes Human Values** by M.Govindarajan, S.Natarajan and V.S.SenthilKumar-PHI Learning Pvt. Ltd-2009.
2. **Engineering Ethics** by Harris, Pritchard and Rabins, Cengage Learning, India Edition, 2009.
3. **Ethics in Engineering** by Mike W. Martin and Roland Schinzinger – Tata McGraw-Hill– 2003.
4. **Professional Ethics and Morals** by Prof.A.R.Aryasri, Dharanikota Suyodhana, Maruthi Publications.
5. **Professional Ethics and Human Values** by A.Alavudeen, R.Kalil Rahman and M.Jayakumaran- Laxmi Publications.
6. **Professional Ethics and Human Values** by Prof.D.R.Kiran-
7. **Indian Culture, Values and Professional Ethics** by PSR Murthy-BS Publication

II Year B.Tech - I Semester

ELECTRICAL ENGINEERING LAB

PART-A

1. Series and parallel resonance- timing, resonant frequency, Bandwidth and Q-Factor determination for RLC Network.
2. Time response of first order RC/RL network for periodic non sinusoidal inputs-time constant and steady state error determination.
3. Z and Y Parameters.
4. Verification of Superposition Theorem and Reciprocity Theorem
5. Verification of Maximum Power Transfer Theorem
6. Verification of Thevenin's and Norton's Theorems.

PART-B

1. Magnetization Characteristics of DC Shunt Generator. Determination of Critical Field Resistance and Critical Speed.
2. Swinburne's Test and Speed Control of DC Shunt Motor. Predetermination of Efficiencies.
3. Brake Test on DC Shunt Motor. Determination of Performance Curves.
4. O.C. & S.C. Tests on Single phase Transformer
5. Brake Test on Three Phase Induction Motor
6. Regulation of Three-Phase Alternator by Z.P.F. and A.S.A Methods

II Year B.Tech - I Semester

ELECTRONIC DEVICES AND CIRCUITS LABORATORY

OBJECTIVES:

- This Lab provides the students to get an electrical model for various semiconductor devices. Students can find and plot V_I characteristics of all semiconductor devices. Student learns the practical applications of the devices. They can learn and implement the concept of the feedback and frequency response of the small signal amplifier

OUTCOMES:

- Students able to learn electrical model for various semiconductor devices and learns the practical applications of the semiconductor devices

PART A: Electronic Workshop Practice

1. Identification, Specifications, Testing of R, L, C Components (Colour Codes), Potentiometers, Coils, Gang Condensers, Relays, Bread Boards.
2. Identification, Specifications and Testing of active devices, Diodes, BJTs, JFETs, LEDs, LCDs, SCR, UJT.
3. Soldering Practice- Simple circuits using active and passive components.
4. Study and operation of Ammeters, Voltmeters, Transformers, Analog and Digital Multimeter, Function Generator, Regulated Power Supply and CRO.

PART B: List of Experiments
(For Laboratory Examination-Minimum of Ten Experiments)

1. P-N Junction Diode Characteristics
   a. Germanium Diode (Forward bias& Reverse bias)
   b. Silicon Diode (Forward bias only)
2. Zener Diode Characteristics
   a. V-I Characteristics
   b. Zener Diode act as a Voltage Regulator
3. Rectifiers (without and with c-filter)
   a. Half-wave Rectifier
   b. Full-wave Rectifier
4. BJT Characteristics(CE Configuration)
   a. Input Characteristics
   b. Output Characteristics
5. FET Characteristics(CS Configuration)
   a. Drain (Output) Characteristics
   b. Transfer Characteristics

6. SCR Characteristics
7. UJT Characteristics
8. Transistor Biasing
9. CRO Operation and its Measurements
10. BJT-CE Amplifier
11. Emitter Follower-CC Amplifier
12. FET-CS Amplifier

PART C: Equipment required for Laboratory

1. Regulated Power supplies
2. Analog/Digital Storage Oscilloscopes
3. Analog/Digital Function Generators
4. Digital Multimeters
5. Decade Résistance Boxes/Rheostats
6. Decade Capacitance Boxes
7. Ammeters (Analog or Digital)
8. Voltmeters (Analog or Digital)
9. Active & Passive Electronic Components
10. Bread Boards
11. Connecting Wires
12. CRO Probes etc.

II Year B.Tech - II Semester

ENVIRONMENTAL SCIENCE

UNIT I: MULTIDISCIPLINARY NATURE OF ENVIRONMENTAL STUDIES AND NATURAL RESOURCES

Definition, Scope and Importance – Need for Public Awareness.

Renewable and non-renewable resources – Natural resources and associated problems – Forest resources – Use and over – exploitation, deforestation, case studies – Timber extraction – Mining, dams and other effects on forest and tribal people – Water resources – Use and over utilization of surface and ground water – Floods, drought, conflicts over water, dams – benefits and problems – Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies – Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies. – Energy resources:

UNIT II : ECOSYSTEMS & BIODIVERSITY AND ITS CONSERVATION

Concept of an ecosystem. – Structure and function of an ecosystem – Producers, consumers and decomposers – Energy flow in the ecosystem – Ecological succession – Food chains, food webs and ecological pyramids – Introduction, types, characteristic features, structure and function of the following ecosystem:

a. Forest ecosystem.
b. Grassland ecosystem
c. Desert ecosystem
d. Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries)

Introduction 0 Definition: genetic, species and ecosystem diversity – Bio-geographical classification of India – Value of biodiversity: consumptive use, Productive use, social, ethical, aesthetic and option values – Biodiversity at global, National and local levels – India as a mega-diversity nation – Hot-soports of biodiversity – Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts – Endangered and endemic species of India – Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity.

UNIT III: ENVIRONMENTAL POLLUTION, SOLID WASTE MANAGEMENT & SOCIAL ISSUES AND THE ENVIRONMENT

Definition, Cause, effects and control measures of :

a. Air Pollution.
b. Water pollution
c. Soil pollution
d. Marine pollution
e. Noise pollution
f. Thermal pollution
g. Nuclear hazards

Causes**,** effects and control measures of urban and industrial waste – Role of an individual in prevention of pollution – Pollution case studies – Disaster management: floods, earthquake, cyclone and landslides.

Social issues and the environment From Unsustainable to Sustainable development – Urban problems related to energy – Water conservation, rain water harvesting, watershed management – Resettlement and rehabilitation of people; its problems and concerns. Case studies – Environmental ethics: Issues and possible solutions – Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust. Case Studies – Wasteland reclamation. – Consumerism and waste products. – Environment Protection Act. – Air (Prevention and Control of Pollution) Act. – Water (Prevention and control of Pollution) Act – Wildlife Protection Act – Forest Conservation Act – Issues involved in enforcement of environmental legislation – Public awareness.

UNIT IV: HUMAN POPULATION AND THE ENVIRONMENT

Population growth, variation among nations. Population explosion–Family Welfare programme. Environment and human health – Human Rights – Value Education – HIV/AIDS – Women and Child Welfare – Role of information Technology in Environment and human health – Case studies.

UNIT V: FIELD WORK

Visit to a local area to document environmental assets River/forest grassland/hill/mountain – Visit to a local polluted site-Urban/Rural/Industrial/Agricultural Study of common plants, insects, birds – river, hill slopes, etc..

TEXT BOOKS :

1. Text book of Environmental Studies for Undergraduate Courses, Erach Bharucha for University Grants Commission, Univ. Press, 2001.
2. Environmental Studies by R.Rajagopalan, Oxford Univ.Press,2008.
3. Environmental Studies by Benny Joseph, Mc.Graw Hill Publications, 2007.

REFERENCES:

1. Text book of Environmental Sciences and Technology by M.Anji Reddy, BS Publication, 2008.
2. Comprehensive Environmental studies by J.P.Sharma, Laxmi publications, 2008.
3. Environmental sciences and engineering – J. Glynn Henry and Gary W. Heinke – Printice hall of India Private limited, 2004.
4. Introduction to Environmental engineering and science by Gilbert M. Masters and Wendell P. Ela - Printice hall of India Private limited, 1992.
5. Environmental Studies by Anindita Basak – Pearson education, 2009.

II Year B.Tech - II Semester

PULSE AND DIGITAL CIRCUITS

OBJECTIVES:-

- To study various wave shaping circuits and their applications.
- To study different circuits that produce non-sinusoidal waveforms(multivibrators) and their applications
- To study various voltage time base generators and their applications.
- To study different logic families and their comparison.

OUTCOMES:

- Students will be able to design different pulse circuits based on the above concepts.

UNIT I
LINEAR WAVESHAPING
High pass, low pass RC circuits, their response for sinusoidal, step, pulse, square and ramp inputs. High Pass RC network as Differentiator, Low Pass RC network as integrator, attenuators and its applications as a CRO probe, RL circuits and its response for step input, Illustrative Problem .

UNIT II
NON-LINEAR WAVE SHAPING
Diode clippers, Transistor clippers, clipping at two independent levels, Comparators, applications of voltage comparators, clamping operation, clamping circuits taking source and Diode resistances into account, Clamping circuit theorem, practical clamping circuits, effect of diode characteristics on clamping voltage, Synchronized Clamping.

UNIT III
MULTIVIBRATORS
Transistor as a switch, Break down voltages, Transistor-Switching Times, Triggering circuits. Analysis and Design of Bistable, Monostable, Astable Multivibrators and Schmitt trigger circuit using BJT.

UNIT IV
TIME BASE GENERATORS
General features of a time base signal, methods of generating time base waveform, Miller and Bootstrap time base generators – basic principles, Transistor miller time base generator, Transistor Bootstrap time base generator, Transistor Current time base generators, Methods of linearity Improvements.
SYNCHRONIZATION AND FREQUENCY DIVISION
Pulse Synchronization of relaxation Devices, Frequency division in sweep circuit, Stability of relaxation Devices, Astable relaxation circuits, Monostable relaxation circuits, Synchronization of a sweep circuit with symmetrical signals.

UNIT V

SAMPLING GATES

Basic operating principles of sampling gates, Unidirectional and Bi-directional sampling gates, Four Diode Sampling Gate, Reduction of pedestal in gate circuits, Six Diode Gate, Application of Sampling Gates.

Digital Logic Circuits: AND, OR, & NOT gates using Diodes, and Transistors, Analysis of DCTL, RTL, DTL, TTL, ECL and CMOS Logic Families, and comparison between the logic families.

TEXT BOOKS:

1. J.Millman, H.Taub and Mothiki S. Prakash Rao, *"Pulse, Digital and Switching Waveforms,"* Tata McGraw Hill, 2nd Edition, 2008.
2. David A. Bell, *"Solid State Pulse Circuits,"* PHI, 4th edition, 2002.
3. Jacob Millman, Christos C. Halkias, Chetan Parikh, *"Milliman's Integrated Electronics,"* Tata McGraw Hill, 2nd Edition, 2009.

REFERENCES:

1. A. Anand Kumar, *"Pulse and Digital Circuits,"* PHI, 2006.
2. Ronald J. Tocci, *"Fundamentals of Pulse and Digital Circuits,"* PHI,3rd edition, 2008.
3. Michel, *"Pulse Circuits,"*
4. L. Strauss, *"Wave Generation and Shaping"* McGraw Hill, 1990.

II Year B.Tech - II Semester

ELECTRONIC CIRCUITS ANALYSIS & DESIGN

Course Objectives:

The aim of this course is to familiarize the student with the analysis and design of multistage amplifiers with compound connections, feedback amplifiers, oscillators, power amplifiers and tuned amplifiers. To study and analyze the frequency response of amplifier circuits.

Course Outcomes:

Upon completion of this course, student will be able to :

- Analyze the frequency response of the BJT amplifiers at low and high frequencies.
- Analyze and design multistage amplifiers with compound connections, feedback amplifiers, oscillators, power amplifiers and tuned amplifiers.

UNIT I

MULTISTAGE AMPLIFIERS.

Classification of Amplifiers- Distortion in amplifiers, Analysis of CE amplifier with Emitter Resistance and Emitter follower, Different Coupling Schemes used in Amplifiers- RC Coupled Amplifier, Direct and Transformer Coupled Amplifiers, Design of Single stage RC Coupled Amplifier Using BJT, Analysis of Cascaded RC Coupled BJT Amplifiers, Darlington Pair, Cascode Amplifier, Illustrative design problems.

UNIT II

FREQUENCY RESPONSE

Logarithms, Decibels, General Frequency considerations, Frequency Response of BJT Amplifier, Analysis at Low and High Frequencies, Effect of Coupling and bypass Capacitors, The Hybrid-pi (π)- Common Emitter Transistor Model, CE short Circuit Current gain, Current gain with Resistive Load, Single Stage CE Transistor Amplifier response, Gain-Bandwidth Product, Emitter follower at higher frequencies, Illustrative design problems.

UNIT III

ANALYSIS AND DESIGN OF FEEDBACK AMPLIFIERS AND OSCILLATORS

Concepts of Feedback, Classification of Feedback Amplifiers, General Characteristics of Negative Feedback Amplifiers, Effect of Feedback on Amplifier characteristics, Voltage Series, Voltage Shunt, Current Series and Current Shunt Feedback Configurations, Illustrative design Problems.

Conditions for Oscillations, RC and LC type Oscillators, RC-Phase shift and Wien-Bridge Oscillators, Generalized Analysis of LC Oscillators, Hartley and Colpitts Oscillators, Crystal Oscillators, Frequency and Amplitude Stability of Oscillators, Illustrative design problems.

UNIT IV

POWER AMPLIFIERS

Classification, Series fed Class A Power Amplifier, Transformer Coupled Class A Amplifier, Efficiency, Push Pull Amplifier- Complementary Symmetry Class-B Power Amplifier, Amplifier Distortion, Power Transistor Heat sinking, Class C and Class D Power ampliifers, Illustrative design problems.

UNIT IV

TUNED AMPLIFIERS

Introduction, Q-Factor, Small Signal Tuned Amplifiers, Effect of Cascading Single Tuned Amplifiers on Bandwidth, Effect of Cascading Double Tuned Amplifiers on Bandwidth, Stagger Tuned Amplifiers, Stability of Tuned Amplifiers, Illustrative design problems.

TEXT BOOKS:

1. Jacob Millman, Christos C. Halkias, Chetan Parikh, *"Milliman's Integrated Electronics,"* Tata McGraw Hill, 2nd Edition, 2009.
2. Robert L.Boylestad, Louis Nashelsky, *"Electronic Devices and Circuit Theory,"* PHI, 9th edition, 2008
3. K.Lal Kishore, *"Electronic Circuit Analysis,"* BSP, 2nd Edition, 2008.

REFERENCE BOOKS:

1. Donald A Neamen, *"Electronic Circuits Analysis and Design,"* Tata McGraw-Hill, 3rd Edition, 2009.
2. Sedra, Kenneth, Smith, *"Microelectric circuits,"* Oxford University Press, 5th Edition, 2011.
3. Mohammad H.Rashid, *"Microelectronics Circuits: Analysis & Design,"* Cengage Learning, 2011.
4. Robert T. Paynter, *"Introductory Electronic Devices and Circuits,"* PEI, 7th Edition, 2009

II Year B.Tech - II Semester

ELECTROMAGNETIC THEORY & TRANSMISSION LINES

Pre requisites by Topics:

(a) Understanding and the ability to use vector algebra, and vector calculus.

(b) Proficiency in the use of vector identities, and various Coordinate systems & transformations.

***Learning Outcomes*:**

This course provides the foundational education in static electromagnetic fields, and time varying electromagnetic waves. Through lecture, and out-of-class assignments, students are provided learning experiences that enable them to:

a. Analyze and solve the problems of electric and magnetic fields that vary with three dimensional spatial co-ordinates as well as with time.

b. Become proficient with analytical skills for understanding propagation of electromagnetic waves in different media.

c. Understand the concept of transmission lines & their applications.

d. Develop technical & writing skills important for effective communication.

e. Acquire team-work skills for working effectively in groups.

UNIT-I

Electrostatics: Review of Vector algebra, Co-ordinate systems & transformation, Vector calculus, Coulomb's Law, Electric Field Intensity – Fields due to Different Charge Distributions, Electric Flux Density, Gauss Law and Applications, Electric Potential, Relations Between E and V, Maxwell's Two Equations for Electrostatic Fields, Electric dipole, Energy Density, Convection and Conduction Currents, Dielectric Constant, Isotropic and Homogeneous Dielectrics, Continuity Equation, Relaxation Time, Poisson's and Laplace's Equations, Capacitance – Parallel Plate, Coaxial, Spherical Capacitors, Illustrative Problems.

UNIT-II

Magnetostatics: Biot-Savart Law, Ampere's Circuital Law and Applications, Magnetic Flux Density, Maxwell's Two Equations for Magnetostatic Fields, Magnetic Scalar and Vector Potentials, Forces due to Magnetic Fields, Magnetic torque and moment, Magnetic dipole, Inductances and Magnetic Energy, Illustrative Problems.

UNIT-III

Maxwell's Equations (for Time Varying Fields): Faraday's Law and Transformer e.m.f, Inconsistency of Ampere's Law and Displacement Current Density, Maxwell's Equations in Different Final Forms and Word Statements. Boundary Conditions of Electromagnetic fields: Dielectric-Dielectric and Dielectric-Conductor Interfaces, Illustrative Problems.

UNIT-IV

EM Wave Characteristics: Wave Equations for Conducting and Perfect Dielectric Media, Uniform Plane Waves – Definition, All Relations between E & H, Sinusoidal Variations, Wave Propagation in Lossless and Conducting Media, Conductors & Dielectrics – Characterization, Wave Propagation in Good Conductors and Good Dielectrics, Polarization,Reflection and Refraction of Plane Waves – Normal and Oblique Incidences, for both Perfect Conductor and Perfect Dielectrics, Brewster Angle, Critical Angle and Total Internal Reflection, Surface Impedance, Poynting Vector, and Poynting Theorem – Applications, Power Loss in a Plane Conductor, Illustrative Problems.

UNIT-V

Transmission Lines: Types, Transmission line parameters (Primary and Secondary), Transmission line equations, Input impedance, Standing wave ratio & power, Smith chart & its applications, Applications of transmission lines of various lengths, Micro-strip transmission lines – input impedance, Illustrative Problems.

TEXT BOOKS:

1. Matthew N.O. Sadiku, *"Elements of Electromagnetics,"* Oxford University Press, 4th Edition, 2008.
2. William H. Hayt Jr. and John A. Buck, *"Engineering Electromagnetics,"* TMH, 7th Edition, 2006.

REFERENCES:

1. E.C. Jordan and K.G. Balmain, *"Electromagnetic Waves and Radiating Systems,"* PHI, 2nd Edition, 2000.
2. John D. Krauss, *"Electromagnetics"*, McGraw- Hill Publications, 3rd Edition, 1988.
3. John D. Ryder, *"Networks, Lines, and Fields,"* PHI publications, 2nd Edition, 2012.
4. Schaum's out – lines, *"Electromagnetics,"* Tata McGraw-Hill publications, 2nd Edition, 2006.
5. G. S. N. Raju, *"Electromagnetic Field Theory and Transmission Lines,"* Pearson Education, 3rd Edition, 2013.
6. N. Narayana Rao, *"Fundamentals of Electromagnetics for Engineering,"* Pearson Education, 1st Edition, 2009.

II Year B.Tech - II Semester

PROBABILITY THEORY & STOCHASTIC PROCESSES

OBJECTIVES:

- To understand the concepts of a Random Variable and operations that may be performed on a single Random variable.
- To understand the concepts of Multiple Random Variables and operations that may be performed on Multiple Random variables.
- To understand the concepts of Random Process and Temporal & Spectral characteristics of Random Processes.

OUTCOMES:

- A student will able to determine the temporal and spectral characteristics of random signal response of a given linear system.

UNIT-I

Probability : Probability introduced through Sets and Relative Frequency: Experiments and Sample Spaces, Discrete and Continuous Sample Spaces, Events, Probability Definitions and Axioms, Mathematical Model of Experiments, Probability as a Relative Frequency, Joint Probability, Conditional Probability, Total Probability, Bays' Theorem, Independent Events:

The Random Variable : Definition of a Random Variable, Conditions for a Function to be a Random Variable, Discrete and Continuous, Mixed Random Variable, Distribution and Density functions, Properties, Binomial, Poisson, Uniform, Gaussian, Exponential, Raleigh, Conditional Distribution, Methods of defining Conditioning Event, Conditional Density, Properties.

UNIT-II

Multiple Random Variables : Vector Random Variables, Joint Distribution Function, Properties of Joint Distribution, Marginal Distribution Functions, Conditional Distribution and Density – Point Conditioning, Conditional Distribution and Density – Interval conditioning, Statistical Independence, Sum of Two Random Variables, Sum of Several Random Variables, Central Limit Theorem, (Proof not expected). Unequal Distribution, Equal Distributions.

Operations on Multiple Random Variables: Expected Value of a Function of Random Variables, Joint Moments about the Origin, Joint Central Moments, Joint Characteristic Functions, Jointly Gaussian Random Variables: Two Random Variables case, N Random Variable case, Properties, Transformations of Multiple Random Variables, Linear Transformations of Gaussian Random Variables.

UNIT-III

Random Processes – Temporal Characteristics: The Random Process Concept, Classification of Processes, Deterministic and Nondeterministic Processes, Distribution and Density Functions, concept of Stationarity and Statistical Independence. First-Order Stationary Processes, Second- Order and Wide-Sense Stationarity, (N-Order) and Strict-Sense Stationarity, Time Averages and Ergodicity, Mean-Ergodic Processes, Correlation-Ergodic Processes, Autocorrelation Function and Its Properties, Cross-Correlation Function and its Properties, Covariance Functions, Gaussian Random Processes, Poisson Random Process.

UNIT-IV

Random Processes – Spectral Characteristics : The Power Spectrum: Properties, Relationship between Power Spectrum and Autocorrelation Function, The Cross-Power Density Spectrum, Properties, Relationship between Cross-Power Spectrum and Cross-Correlation Function.

UNIT-V

Linear Systems with Random Inputs : Random Signal Response of Linear Systems: System Response – Convolution, Mean and Mean-squared Value of System Response, autocorrelation Function of Response, Cross-Correlation Functions of Input and Output, Spectral Characteristics of System Response: Power Density Spectrum of Response, Cross-Power Density Spectrums of Input and Output, Band pass, Band-Limited and Narrowband Processes, Properties.

Text Books :

1. Peyton Z. Peebles, *"Probability, Random Variables & Random Signal Principles,"* TMH, 4th Edition, 2001.
2. Athanasios Papoulis and S. Unnikrishna Pillai, *"Probability, Random Variables and Stochastic Processes,"* PHI, 4th Edition, 2002.

References:

1. R.P. Singh and S.D. Sapre, *"Communication Systems: Analog & Digital,"* TMH, 1995.
2. Henry Stark and John W.Woods, *"Probability and Random Processes with Application to Signal Processing,"* Pearson Education, 2nd Edition, 2007.
3. George R. Cooper, Clave D. MC Gillem, *"Probability Methods of Signal and System Analysis,"* Oxford University Press, 3rd Edition, 1999.
4. S.P. Eugene Xavier, *"Statistical Theory of Communication,"* New Age Publications, 2003.
5. B.P. Lathi, *"Signals, Systems & Communications,"* B.S. Publications, 2003.

II Year B.Tech - II Semester

ANALOG COMMUNICATION SYSTEMS

Objectives:

- To study the fundamental concept of the analog communication systems.
- To analyze various analog modulation and demodulation techniques.
- To know the working of various transmitters and receivers.
- To understand the influence of noise on the performance of analog communication systems, and to acquire the knowledge about information and capacity.

Learning Outcomes:

This course provides the foundational education in Analog Communication systems, and applications. The students are provided the learning experience through class room teaching and solving assignment & tutorial problems. At the end of course, students should be able to:

- Acquire knowledge on the basic concepts of Analog Communication Systems.
- Analyze the analog modulated and demodulated systems.
- Verify the effect of noise on the performance of communication systems.
- Know the fundamental concepts of information and capacity.

UNIT- I

Introduction: Elements of communication systems, Information, Messages and Signals, Modulation, Modulation Methods, Modulation Benefits and Applications.

Amplitude Modulation & Demodulation: Baseband and carrier communication, Amplitude Modulation (AM), Rectifier detector, Envelope detector, Double sideband suppressed carrier (DSB-SC) modulation & its demodulation, Switching modulators, Ring modulator, Balanced modulator, Frequency mixer, sideband and carrier power of AM, Generation of AM signals, Quadrature amplitude modulation (QAM), Single sideband (SSB) transmission, Time domain representation of SSB signals & their demodulation schemes (with carrier, and suppressed carrier), Generation of SSB signals, Vestigial sideband (VSB) modulator & demodulator, Carrier Acquisition- phased locked loop (PLL), Costas loop, Frequency division multiplexing (FDM), and Super-heterodyne AM receiver, Illustrative Problems.

UNIT- II

Angle Modulation &Demodulation: Concept of instantaneous frequency, Generalized concept of angle modulation, Bandwidth of angle modulated waves – Narrow band frequency modulation (NBFM); and Wide band FM (WBFM), Phase modulation, Verification of Frequency modulation bandwidth relationship, Features of angle modulation, Generation of FM waves – Indirect method, Direct generation; Demodulation of FM, Bandpass limiter, Practical frequency demodulators, Small error analysis, Pre-emphasis, & De-emphasis filters, FM receiver, FM Capture Effect, Illustrative Problems.

UNIT- III

Noise in Communication Systems: Thermal noise, Time domain representation of narrowband noise, Filtered white noise, Quadrature representation of narrowband noise, Envelope of narrowband noise plus sine wave, Signal to noise ratio & probability of error, Noise equivalent bandwidth, Effective noise temperature, and Noise figure, Baseband systems with channel noise, Performance analysis (i.e. finding SNR expression) of AM, DSB-SC, SSB-SC, FM, PM in the presence of noise, Illustrative Problems.

UNIT- IV

Analog pulse modulation schemes: Pulse amplitude modulation – Natural sampling, flat top sampling and Pulse amplitude modulation (PAM) & demodulation, Pulse-Time Modulation – Pulse Duration and Pulse Position modulations, and demodulation schemes, PPM spectral analysis, Illustrative Problems.
Radio Receiver measurements: Sensitivity, Selectivity, and fidelity.

UNIT- V

Information & Channel Capacity: Introduction, Information content of message, Entropy, Entropy of symbols in long independent and dependent sequences, Entropy and information rate of Markoff sources, Shannon's encoding algorithm, Discrete communication channels, Rate of information over a discrete channel, Capacity of discrete memoryless channels, Discrete channels with memory, Shannon – Hartley theorem and its implications, Illustrative problems.

TEXT BOOKS:

1. B. P. Lathi, *"Modern Digital and Analog Communication Systems,"* Oxford University Press, 3rd Edition, 2006.
2. Sham Shanmugam, *"Digital and Analog Communication Systems,"* Wiley India Edition, 2006.
3. Bruce Carlson, & Paul B. Crilly, *"Communication Systems – An Introduction to Signals & Noise in Electrical Communication,"* McGraw Hill International Edition, 5th Edition, 2010.

REFERENCES:

1. Simon Haykin, *"Communication Systems,"* Wiley India edition, 3rd edition, 2010.
2. Herbert Taub & Donald L Schilling, *"Principles of Communication Systems,"* Tata McGraw-Hill, 3rd Edition, 2009.
3. R.E. Ziemer & W.H. Tranter, *"Principles of Communication-Systems Modulation & Noise,"* Jaico Publishing House, 2001.
4. George Kennedy and Bernard Davis, *"Electronics & Communication System,"* TMH, 2004.

II Year B.Tech - II Semester

ELECTRONIC CIRCUIT ANALYSIS AND DESIGN LAB

List of Experiments (12 experiments to be done):

OBJECTIVES

- Help students make transition from analysis of electronic circuits to design of electronic circuits.
- To understand the Analysis of transistor at high frequencies.
- To understand the concept of designing of tuned amplifier.
- The student will construct and analyze voltage regulator circuits.
- To understand the circuit configuration and the principle operation of converters, including diode rectifiers, controlled AC-DC converters and DC choppers

OUTCOMES:

- The ability to analyze and design single and multistage amplifiers at low, mid and high frequencies.
- Designing and analyzing the transistor at high frequencies.
- Determine the efficiencies of power amplifiers.
- Determine Frequency response and design of tuned amplifiers.
- Able to analyze all the circuits using simulation software and Hardware.

I) Design and Simulation in Simulation Laboratory using Any Simulation Software. (Minimum of 6 Experiments):

1. Common Emitter Amplifier
2. Common Source Amplifier
3. A Two Stage RC Coupled Amplifier.
4. Current shunt and Voltage Series Feedback Amplifier
5. Cascade Amplifier
6. Wien Bridge Oscillator using Transistors
7. RC Phase Shift Oscillator using Transistors
8. Class A Power Amplifier (Transformer less)
9. Class B Complementary Symmetry Amplifier
10. High Frequency Common base (BJT) / Common gate (JFET) Amplifier.

II) Testing in the Hardware Laboratory (6 Experiments)

Any Three circuits simulated in Simulation laboratory

Any Three of the following

1. Class A Power Amplifier (with transformer load)
2. Class C Power Amplifier
3. Single Tuned Voltage Amplifier
4. Hartley & Colpitt's Oscillators.
5. Darlington Pair.
6. MOSFET Amplifier

III) Equipments required for Laboratories:

<u>For software simulation of Electronic circuits</u>

Computer Systems with latest specifications.
Connected in LAN (Optional).
Operating system (Windows XP).
Suitable Simulations software.

<u>For Hardware simulations of Electronic Circuits</u>

Regulated Power Supply (0-30V)
CRO's
Functions Generators.
Multimeters.
Components.

II Year B.Tech - II Semester

PULSE & DIGITAL CIRCUITS LAB

OBJECTIVES:

- T*o* generate Different types of non-sinusoidal signals.
- To generate and processing of non-sinusoidal signals.
- To learn about Limiting and storage circuits and their applications.
- To learn about Different synchronization techniques, basics of different sampling gates and their uses.
- To obtain Basics of digital logic families.

OUTCOMES:

- Student understands the various design and analysis to generate various types of signals.
- Student can design various digital circuits based on the application and specifications.

Minimum Twelve experiments to be conducted:

1. Linear wave shaping.
2. Non Linear wave shaping – Clippers.
3. Non Linear wave shaping – Clampers.
4. Transistor as a switch.
5. Study of Logic Gates & Some applications.
6. Study of Flip-Flops & some applications.
7. Sampling Gates.
8. Astable Multivibrator.
9. Monostable Multivibrator.
10. Bistable Multivibrator.
11. Schmitt Trigger.
12. UJT Relaxation Oscillator.
13. Bootstrap sweep circuit.
14. Constant Current Sweep Generator using BJT.

Equipment required for Laboratories:

1. RPS - 0 – 30 V
2. CRO - 0 – 20 M Hz.
3. Function Generators - 0 – 1 M Hz
4. Components
5. Multi Meters

B.Tech III-I Sem. (E.C.E)

CONTROL SYSTEMS ENGINEERING

L	T	P	C
3	1	0	3

Objective:

In this course it is aimed to introduce to the students the principles and applications of control systems in everyday life. The basic concepts of block diagram reduction, time domain analysis solutions to time invariant systems and also deals with the different aspects of stability analysis of systems in frequency domain and time domain.

UNIT – I Introduction

Concepts of Control Systems- Open Loop and closed loop control systems and their differences- Examples of control systems- Classification of control systems, Feed-Back Characteristics, Effects of feedback. Mathematical models – Differential equations of Translational and Rotational mechanical systems, and Electrical Systems, Block diagram algebra –Signal flow graph - Reduction using Mason's gain formula. Transfer Function of DC Servo motor - AC Servo motor - Synchro transmitter and Receiver

UNIT-II Time Response Analysis

Standard test signals - Impulse Response - Time response of first order systems – Characteristic Equation of Feedback control systems, Transient response of second order systems - Time domain specifications – Steady state response - Steady state errors and error constants – Effects of proportional, integral, derivative Controls, Design P, PD, PI, PID Controllers.

UNIT – III Stability Analysis In S-Domain

The concept of stability – Routh's stability criterion – qualitative stability and conditional stability – limitations of Routh's stability. The root locus concept - construction of root loci-effects of adding poles and zeros to G(s)H(s) on the root loci.

UNIT – IV Frequency Response Analysis

Introduction, Frequency domain specifications-Bode diagrams-Determination of Frequency domain specifications and transfer function from the Bode Diagram-Phase margin and Gain margin-Stability Analysis from Bode Plots. Polar Plots-Nyquist Plots-Stability Analysis.

Compensation techniques – Lag, Lead, Lead-Lag Controllers design in frequency Domain. PID Controllers design.

UNIT – V State Space Analysis Of Continuous Systems

Concepts of state, state variables and state model, derivation of state models from Schematic models, differential equations, Transfer function, block diagrams, Diagonalization- Solving the Time invariant state Equations- State Transition Matrix and it's Properties. Complete response of State Space models

TEXT BOOKS:

1. Control systems engineering – by S. PALANI - Tata McGraw Hill.
2. Control Systems Engineering – by I. J. Nagrath and M. Gopal, New Age International (P) Limited, Publishers, 5th edition, 2007.
3. Control Systems – A. Anand Kumar, Prentice Hall of India Pvt. Ltd.,

REFERENCE BOOKS:

1. Modern Control Engineering – by Katsuhiko Ogata – Prentice Hall of India Pvt. Ltd., 5th edition, 2010.
2. Control Systems Engineering - by NISE 5th Edition – John wiley.
3. Control Systems – by – A. Nagoor Kani- First Edition RBA Publications.
4. Automatic Control Systems– by B. C. Kuo and Farid Golnaraghi – John wiley and son's, 8th edition, 2003.

III B.Tech I Sem (E.C.E)

COMPUTER ARCHITECTURE AND ORGANIZATION

L	T	P	C
3	1	0	3

Course Objectives:

1. To understand the structure, function, characteristics and performance issues of computer systems.
2. To understand the design of the various functional units of digital computers
3. To understand I/O transfer mechanism, design of I/O circuit interfaces and example bus standards (like PCI, SCSI, USB)
4. To understand the basic processing unit and how they are connected and how it generates control signals (using hardwired and micro-programmed approaches)
5. To understand the different types of memory and how they are related.
6. To learn basics of Parallel Computing and Pipelining.

Learning Outcomes:

a. Students can able to learn about computer performance, computer design, and tradeoffs between cost and performance as well as between hardware and software
b. Students can able to formulate and solve problems, understand the performance requirements of systems
c. Students can able to learn to communicate effectively and learn to think creatively and critically, both independently and with others.
d. Students can able to learn about all the detailed design issues and circuits of each unit.

UNIT-I

Basic Structure of Computers: Computer types, Functional units, basic operational concepts, Bus structures, Data types, Software: Languages and Translators, Loaders, Linkers, Operating systems.

Addressing Methods and Machine Program Sequencing: Memory locations – addresses and encoding of information – main memory operations – Instruction formats and instruction sequences – Addressing modes and instructions – Simple input programming – pushdown stacks – subroutines.

UNIT-II

Register Transfer and Micro Operations: Register transfer Language, Register transfer, Bus and Memory Transfers, Arithmetic Micro operations, Logic Micro operations, shift Micro operations, Arithmetic Logic Shift Unit.

Central Processing Unit: Stack organization, instruction formats, Addressing modes, Data transfer and manipulation, Execution of a complete instruction, Sequencing of control signals, Program Control.

UNIT-III

Micro-Programmed Control: Control Memory, address Sequencing, Micro Program Example, Design of Control Unit.

Computer Arithmetic: Addition and Subtraction, Multiplication Algorithms, Division Algorithms, Floating Point Arithmetic Operations, Decimal Arithmetic Unit, Decimal Arithmetic Operations.

UNIT-IV

Input-Output Organization: Peripheral Devices, Input-Output Interface, Asynchronous Data Transfer, Modes of Transfer, Priority Interrupt, Direct Memory Access (DMA), Input-Output Processor (IOP), Serial Communication.

Memory Organization: Memory hierarchy, main memory, auxiliary memory, Associative memory, Cache memory, Virtual memory, Memory management hardware.

UNIT-V

Pipeline and Vector Processing: Parallel Processing, Pipelining, Arithmetic Pipeline, Instruction Pipeline, RISC Pipeline Vector Processing, Array Processors.

Multi-Processors: Characteristics of Multiprocessors, Interconnection Structures, Inter processor Arbitration, Inter-processor Communication and Synchronization, Cache Coherence.

TEXT BOOKS :

1. M. Morris Mano, "Computer system Architecture", Prentice Hall of India (PHI), Third edition.
2. William Stallings, "Computer organization and programming", Prentice Hall of India (PHI) Seventh Edition, Pearson Education(PE) Third edition, 2006.

REFERENCE BOOKS:

1. Carl Hamacher, Zvonks Vranesic, Safwat Zaky, "Computer Organization" 5th Edition, McGraw Hill, 2002.
2. Andrew S.Tanenbaum, "Structured Computer Organization", 4th Edition PHI/Pearson
3. John L.Hennessy and David A.Patterson, "Computer Architecture a quantitative approach", Fourth Edition Elsevier
4. Joseph D.Dumas II, "Computer Architecture: Fundamentals and Principals of Computer Desigb", BS Publication.

III B.Tech I Sem (E.C.E)

ANTENNAS & WAVE PROPAGATION

L	T	P	C
3	1	0	3

Course Objectives:

1. To introduce the fundamental principles of antenna theory and various types of antennas.
2. Applying the principles of antennas to the analysis, design, and measurements of antennas.
3. To know the applications of some basic and practical configurations such as dipoles, loops, and broadband, aperture type and horn antennas.

Learning Outcomes:

Through lecture, and out-of-class assignments, students are provided learning experiences that enable them to:

a. Understand the basic principles of all types of antennas and
b. Analyze different types of antennas designed for various frequency ranges.
c. Become proficient with analytical skills for understanding practical antennas.
d. Design some practical antennas such as dipole, Yagi-uda, and horn antennas.
e. Determine the radiation patterns (in principal planes) of antennas through measurement setups.
f. Develop technical & writing skills important for effective communication.
g. Acquire team-work skills for working effectively in groups.

UNIT - I

Antenna Basics & Dipole antennas:Introduction, Basic antenna parameters- patterns, Beam Area, Radiation Intensity, Beam Efficiency, Directivity-Gain-Resolution, Antenna Apertures, Effective height, Fields from oscillating dipole, Field Zones, Shape-Impedance considerations, Polarization – Linear, Elliptical, & Circular polarizations, Antenna temperature, Antenna impedance, Front–to-back ratio, Antenna theorems, Radiation – Basic Maxwell’s equations, Retarded potential-Helmholtz Theorem, Radiation from Small Electric Dipole, Quarter wave Monopole and Half wave Dipole – Current Distributions, Field Components, Radiated power, Radiation Resistance, Beam width, Natural current distributions, far fields and patterns of Thin Linear Center-fed Antennas of different lengths, Illustrative problems.

UNIT- II

VHF, UHF and Microwave Antennas - I: Loop Antennas - Introduction, Small Loop, Comparison of far fields of small loop and short dipole, Radiation Resistances and Directives of small and large loops (Qualitative Treatment), Arrays with Parasitic Elements - Yagi - Uda Arrays, Folded Dipoles & their characteristics. Helical Antennas-Helical Geometry, Helix modes, Practical Design considerations for Monofilar Helical Antenna in Axial and Normal Modes. Horn Antennas- Types, Fermat’s Principle, Optimum Horns, Design considerations of Pyramidal Horns, Illustrative Problems.

UNIT - III

VHF, UHF and Microwave Antennas - II: Micro strip Antennas- Introduction, features, advantages and limitations, Rectangular patch antennas- Geometry and parameters, characteristics of Micro strip antennas, Impact of different parameters on characteristics, reflector antennas - Introduction, Flat sheet and corner reflectors, parabola reflectors- geometry, pattern characteristics, Feed Methods, Reflector Types - Related Features, Lens Antennas -

Geometry of Non-metallic Dielectric Lenses, Zoning , Tolerances, Applications, Illustrative Problems.

UNIT- IV

Antenna Arrays & Measurements:Point sources - Definition, Patterns, arrays of 2 Isotropic sources- Different cases, Principle of Pattern Multiplication, Uniform Linear Arrays – Broadside Arrays, Endfire Arrays, EFA with Increased Directivity, Derivation of their characteristics and comparison, BSAa with Non-uniform Amplitude Distributions - General considerations and Bionomial Arrays, Illustrative problems.

Antenna Measurements: Introduction, Concepts- Reciprocity, Near and Far Fields, Coordination system, sources of errors, Patterns to be Measured, Pattern Measurement Arrangement, Directivity Measurement , Gain Measurements (by comparison, Absolute and 3-Antenna Methods).

UNIT - V

Wave Propagation: Introduction, Definitions, Characterizations and general classifications, different modes of wave propagation, Ray/Mode concepts, Ground wave propagation (Qualitative treatment) - Introduction, Plane earth reflections, Space and surface waves, wave tilt, curved earth reflections, Space wave propagation - Introduction, field strength variation with distance and height, effect of earth's curvature, absorption, Super refraction, M-curves and duct propagation, scattering phenomena, tropospheric propagation, fading and path loss calculations, Sky wave propagation - Introduction, structure of Ionosphere, refraction and reflection of sky waves by Ionosphere, Ray path, Critical frequency, MUF, LUF, OF, Virtual height and Skip distance, Relation between MUF and Skip distance, Multi-HOP propagation, Energy loss in Ionosphere, Summary of Wave Characteristics in different frequency ranges, Illustrative problems.

TEXT BOOKS:

1. John D. Kraus and Ronald J. Marhefka and Ahmad S.Khan, "Antennas and wave propagation," TMH, New Delhi, 4th Ed., (special Indian Edition), 2010.
2. E.C. Jordan and K.G. Balmain, "Electromagnetic Waves and Radiating Systems," PHI, 2nd Edn, 2000.

REFERENCES:

1. C.A. Balanis, "Antenna Theory- Analysis and Design," John Wiley & Sons, 2nd Edn., 2001.
2. K.D. Prasad, Satya Prakashan, "Antennas and Wave Propagation," Tech. India Publications, New Delhi, 2001.
3. E.V.D. Glazier and H.R.L. Lamont, "Transmission and Propagation - The Services Text Book of Radio," vol. 5, Standard Publishers Distributors, Delhi.
4. F.E. Terman, "Electronic and Radio Engineering," McGraw-Hill, 4th edition, 1955.
5. John D. Kraus, "Antennas," McGraw-Hill (International Edition), 2nd Edn., 1988.

III B.Tech I Sem (E.C.E)

DIGITAL COMMUNICATION SYSTEMS

L	T	P	C
3	1	0	3

Course Objectives:

1. The students to be able to understand, analyze, and design fundamental digital communication systems.
2. To know various coding techniques such as source coding, line coding, and channel coding.
3. To understand various digital modulation techniques and their applications.
4. The course focuses on developing a thorough understanding of digital communication systems by using a series of specific examples and problems.

Learning Outcomes:

At the end of the course, the students should be able to:

a. Know the difference between source coding, channel coding, and line coding techniques and apply their concepts in the analysis and design of digital communication systems.
b. Understand the basic principles of baseband and pass band digital modulation schemes.
c. Analyze probability of error performance of digital systems and are able to design digital communication systems.
d. Understand the basics of information theory and error correcting codes.

UNIT – I

Source Coding Systems: Introduction, sampling process, quantization, quantization noise, conditions for optimality of quantizers, encoding, Pulse-Code Modulation (PCM), Line codes, Differential encoding, Regeneration, Decoding & Filtering, Noise considerations in PCM systems, Time-Division Multiplexing (TDM), Synchronization, Delta modulation (DM), Differential PCM (DPCM), Processing gain, Adaptive DPCM (ADPCM), Comparison of the above systems.

UNIT – II

Baseband Pulse Transmission: Introduction, Matched filter, Properties of Matched filter, Matched filter for rectangular pulse, Error rate due to noise, Inter-symbol Interference (ISI), Nyquist's criterion for distortion less baseband binary transmission, ideal Nyquist channel, Raised cosine filter & its spectrum, Correlative coding – Duo binary & Modified duo binary signaling schemes, Partial response signaling, Baseband M-array PAM transmission, Eye diagrams.

UNIT – III

Signal Space Analysis: Introduction, Geometric representation of signals, Gram-Schmidt orthogonalization procedure, Conversion of the Continuous AWGN channel into a vector channel, Coherent detection of signals in noise, Correlation receiver, Equivalence of correlation and Matched filter receivers, Probability of error, Signal constellation diagram.

UNIT - IV

Passband Data Transmission: Introduction, Passband transmission model, Coherent phase-shift keying – binary phase shift keying (BPSK), Quadrature Phase shift keying (QPSK), Binary Frequency shift keying (BFSK), Differential PSK, Error probabilities of BPSK, QPSK, BFSK and DPSK, Generation and detection of Coherent BPSK, QPSK & BFSK, Power spectra of above mentioned modulated signals, M-array PSK, M-array quadrature amplitude modulation (M-array QAM), Comparison of power bandwidth requirements for all the above schemes.

UNIT – V

Channel Coding: Error Detection & Correction - Repetition & Parity Check Codes, Interleaving, Code Vectors and Hamming Distance, Forward Error Correction (FEC) Systems, Automatic Retransmission Query (ARQ) Systems, Linear Block Codes – Matrix Representation of Block Codes, Convolutional Codes – Convolutional Encoding, Decoding Methods.

TEXT BOOKS:

1. Sam Shanmugam, "Digital and Analog Communication Systems", John Wiley, 2005.
2. B.P. Lathi, & Zhi Ding, "Modern Digital & Analog Communication Systems", Oxford University Press, International 4th edition, 2010.

REFERENCES:

1. Simon Haykin, "Analog Communication Systems," Wiley India Edition, 4th Edition, 2011.
2. A. Bruce Carlson, & Paul B. Crilly, "Communication Systems – An Introduction to Signals & Noise in Electrical Communication", McGraw-Hill International Edition, 5th Edition, 2010.
3. Bernard Sklar, "Digital Communications", Prentice-Hall PTR, 2nd edition, 2001.
4. Herbert Taub & Donald L Schilling, "Principles of Communication Systems", Tata McGraw-Hill, 3rd Edition, 2009.
5. J. G. Proakis, M Salehi, Gerhard Bauch, "Modern Communication Systems Using MATLAB," CENGAGE, 3rd Edition, 2013.

III B.Tech I Sem (E.C.E)

LINEAR IC APPLICATIONS

L	T	P	C
3	1	0	3

Course objectives: To make the students understand basic concepts in the design of electronic circuits using linear integrated circuits and their applications. To introduce some special function IC's.

Learning outcomes: Upon completion of the course, students will be able to:

a. Understanding basic building block of linear integrated circuits and its characteristics.
b. Analyze the linear non-linear and specialized applications of operational amplifiers.
c. Understand the theory of ADC and DAC.

UNIT –I Differential Amplifier and Opamps

Differential amplifiers: Differential amplifier configurations, Balanced and unbalanced output differential amplifiers, current mirror, level translator.

Operational amplifiers: Introduction, Block diagram, Ideal Op-Amp, Equivalent circuit, Voltage Transfer curve, open loop op-amp configurations, Introduction to dual OP-AMP TL082 as a general purpose JFET-input Operational Amplifier.

UNIT –II OP-AMP with Negative Feedback and Frequency Response

Introduction, feedback configurations, voltage series feedback, voltage shunt feedback and differential amplifiers, properties of Practical op-amp.

Frequency response: Introduction, compensating networks, frequency response of internally compensated op-amps and non compensated op-amps, High frequency op-amp equivalent circuit, open loop gain Vs frequency, close loop frequency response, circuit stability, slew rate.

UNIT-III OP-AMP Appications-1

DC and AC amplifiers, peaking amplifiers, summing, scaling and averaging amplifiers, instrumentation amplifier, voltage to current converter, current to voltage converter, integrator, differentiator, active filters, First, Second and Third order Butterworth filter and its frequency response, Tow-Thomas bi-quad filter.

UNIT-IV OP-AMP Appications-2

Oscillators: Phase shift and Wien bridge oscillators, square, triangular and sawtooth wave generators, comparators, Zero crossing detector, Schmitt trigger, Characteristics and limitations.

Specialized applications: 555 timer IC (monostable & astable operation) & its applications, PLL operating principles, Monolithic PLL, applications, analog amplifier and phase detection, Wide bandwidth precision analog multiplier MPY634 and its applications.

UNIT V Analog to Digital And Digital To Analog Converters

Analog and Digital Data Conversions ,D/A Converter -specifications-Weighted resistor type , R-2R ladder type ,Voltage Mode And current- Mode R-2R ladder types _switches for D/A Converters, High speed sample-and – hold circuits, A/D Converters-specifications-Flash type-Successive Approximation type-Single slope type-Dual slope type –A/D Converter using Voltage –to–Time Conversion–Over sampling A/D Converters..

TEXT BOOKS:

1. D.Roy Chowdhury, "Linear integrated circuits", New Age International (P) Ltd, 2nd Edition, 2003.
2. K.Lal Kishore, "Operational Amplifiers and Linear Integrated Circuits", Pearson Education, 2007.
3. TL082 Data sheet: http://www.ti.com/lit/ds/symlink/tl082.pdf
4. Application note: http://www.ti.com/lit/an/sloa020a/sloa020a.pdf
5. MPY634 Data sheet: http://www.ti.com/lit/ds/symlink/mpy634.pdf
6. Application note: http://www.ti.com/lit/an/sbfa006/sbfa006.pdf

REFERENCES:

1. Ramakanth A.Gayakwad,"Op-amps and Linear ICs", PHI, 4th Edition,1987.
2. R.F.Coughlin and Fredrick Driscoll, "Op-amps and Linear ICs", 6th Edition, PHI.
3. David A.Bell,"Op-amps and Linear ICs", Oxford University press, 2nd Edition, 2010.
4. Sergio Franco,"design with Op-Amps and Analog ICs", McGraw Hill, 1988.
5. C.G.Clayton,"Op-amps", Butterworth and Company Publ.ltd/Elsevier, 1971.

III B.Tech I Sem (E.C.E)

DIGITAL IC APPLICATIONS

L	T	P	C
3	1	0	3

Course Objectives:

1. To be able to use computer-aided design tools for development of complex digital logic circuits
2. To be able to model, simulate, verify, analyze, and synthesize with hardware description languages
3. To be able to design and prototype with standard cell technology and programmable logic
4. To be able to design tests for digital logic circuits, and design for testability

Learning Outcomes: Students can

a. Able to use computer-aided design tools for development of complex digital logic circuits.
b. Able to model, simulate, verify, analyze, and synthesize with hardware description languages.
c. Able to design and prototype with standard cell technology and programmable logic.
d. Able to design tests for digital logic circuits, and design for testability.

UNIT-I

Cmos Logic: Introduction to logic families, CMOS logic, CMOS steady state electrical behavior, CMOS dynamic electrical behavior, CMOS logic families.

Bipolar Logic And Interfacing: Bipolar logic, Transistor logic, TTL families, CMOS/TTL interfacing, low voltage CMOS logic and interfacing, Emitter coupled logic, Comparison of logic families, Familiarity with standard 74XX and CMOS 40XX series-ICs – Specifications.

UNIT-II

The VHDL Hardware Description Language: Design flow, program structure, types and constants, functions and procedures, libraries and packages.

The VHDL design elements: Structural design elements, behavioral design elements, time dimension and simulation synthesis.

UNIT-III

Combinational Logic Design: Decoders, encoders, three state devices, multiplexers and demultiplexers, Code Converters, EX-OR gates and parity circuits, comparators, adders & subtractors, ALUs, Combinational multipliers, VHDL models for the above ICs.

UNIT- IV

Design Examples (using VHDL): Barrel shifter, comparators, floating-point encoder, and dual parity encoder.

Sequential logic Design: Latches & flip flops, PLDs, counters, shift register and their VHDL models, Synchronous design methodology.

UNIT-V

ROMs: Internal Structure, 2D – decoding commercial types, timing and applications.
Static RAMs: Internal Structure, timing and standard SRAMs, Synchronous SRAMs.
Dynamic RAMs: Internal Structure, timing and standard DRAMs, Synchronous DRAMs.

TEXT BOOKS:

1. Digital Design Principles & Practices – John F. Wakerly, PHI/ Pearson Education Asia, 3rd Ed., 2005.
2. A VHDL Primer – J. Bhasker, Pearson Education/ PHI, 3rd Edition.

REFERENCES:

1. Digital System Design Using VHDL – Charles H. Roth Jr., PWS Publications, 2nd edition, 2008.
2. Fundamentals of Digital Logic with VHDL Design – Stephen Borwn and Zvonko Vramesic, McGraw Hill, 2nd Edition., 2005.

III B.Tech I Sem (E.C.E)

IC APPLICATIONS LAB

L	T	P	C
0	0	3	2

Course Objectives:

1. To verify the applications of Op-amp
2. To verify applications IC555, IC565 and IC566
3. To use computer-aided design tools for development of complex digital logic circuits
4. To model, simulate, verify, analyze, and synthesize with hardware description languages
5. To design and prototype with standard cell technology and programmable logic
6. To design tests for digital logic circuits and design for testability

Learning Outcomes:

a. Able to verify applications of Op-amp
b. Able to verify applications of IC555 and IC566
c. Able to use computer-aided design tools for development of complex digital logic circuits.
d. Able to model, simulate, verify, analyze, and synthesize with hardware description languages.
e. Able to design and prototype with standard cell technology and programmable logic.
f. Able to design tests for digital logic circuits, and design for testability.

All Experiments are to be conducted:

Part A (IC Application Lab):

1. Study the characteristics of negative feedback amplifier
2. Design of an Instrumentation amplifier
3. Study the characteristics of regenerative feedback system with extension to design an astable multivibrator
4. Study the characteristics of integrator circuit
5. Design of Analog filters (2nd order bandpass filter and Notch filter)
6. Design of a self tuned filter
7. Design of a function generator
8. Design of a Voltage Controlled Oscillator (VCO)
9. Design of a Phase Locked Loop (PLL)
10. Automatic Gain Control (AGC) Automatic Volume Control (AVC)
11. Design of a low drop out voltage regulator
12. DC-DC converter

Equipment required for Laboratories:

1. RPS
2. CRO
3. Function Generator
4. Multi Meters
5. ASLK Pro trainer kit
6. Analog IC Tester

III B.Tech I Sem (E.C.E)

ANALOG COMMUNICATION SYSTEMS LAB

L	T	P	C
0	0	3	2

Course Objectives:

1. To provide a real time experience for different analog modulation systems and demodulation schemes
2. To provide exposure to the real time behavior of different elements available in analog communication system such as filters, amplifiers etc
3. To perform radio receiver measurements and antenna measurements

Learning Outcomes:

After completion of the course the students will be able

a. To experience real time behavior of different analog modulation schemes
b. Technically visualize spectra of different analog modulation schemes
c. Analyze practical behavior of different elements available in analog communication system such as filters, amplifiers etc.
d. Measure characteristics of radio receiver and antenna measurements.

List of Experiments: (All Experiments are to be conducted)

1. Amplitude modulation and demodulation.
2. Frequency modulation and demodulation.
3. Characteristics of Mixer.
4. Pre-emphasis & de-emphasis.
5. Pulse amplitude modulation & demodulation.
6. Pulse width modulation & demodulation
7. Pulse position modulation & demodulation.
8. Radio receiver measurements – sensitivity, selectivity and fidelity.
9. Measurement of half power beam width (HPBW) and gain of a half wave dipole antenna.
10. Measurement of radiation pattern of a loop antenna in principal planes.

Equipment required for the Laboratory:

1. Regulated Power Supply equipments: 0 – 30 V
2. CROs: 0 – 20 M Hz.
3. Function Generators: 0 – 3 M Hz
4. RF Signal Generators: 0 – 1000 M Hz
5. Multimeters
6. Required electronic components (active and passive) for the design of experiments from 1-7
7. Radio Receiver Demo kits or Trainers.
8. RF power meter frequency range: 0 – 1000 MHz
9. Spectrum Analyzer
10. Dipole antennas (2 Nos.): 850 MHz – 1GHz
11. Loop antenna (1 no.): 850 MHz – 1GHz
12. Bread Boards

B. Tech. III-II Year (ECE)

COMPUTER NETWORKS

L	T	P	C
3	1	0	3

Course Objectives:

- Study the evolution of computer networks and future direction
- Study the concepts of computer networks from layered perspective
- Study the issues open for research in computer networks

Course Outcomes:

- Use appropriate transmission media to connect to a computer network and Internet
- Work on the open issues for their project
- Start using the Internet effectively
- Able to design new protocols for computer network

UNIT -I

Data Communications, Network, Business and Home applications of Computer Network, Internet history, Standards and Administration, Network hardware, Network Software: Protocol Hierarchies- Design Issues for the Layers- Connection-Oriented Versus Connectionless Service, Reference Models.

Data and Signals, Periodic Analog Signals, Digital Signals, Transmission Impairment, Data rate Limits, Performance, Circuit-Switched Networks, Packet Switching, Guided Transmission Media.

UNIT -2

Data Link Layer Design Issues, Error Detection and Correction, Elementary Data Link Protocols, Sliding Window Protocols, The Channel Allocation Problem, Multiple Access Protocols, Ethernet

UNIT -3

Data Link Layer Switching, Routing algorithms: The Optimality Principle-Shortest path Algorithm-Flooding-Distance Vector Routing-Link State Routing-Hierarchical Routing-Broadcast Routing-Multicast Routing-Anycast Routing, Congestion Control Algorithms

UNIT -4

Internetworking, The Network Layer in the Internet: The IP Version 4 Protocol- IP Addresses-IP Version 6- Internet Control Protocols- Label Switching and MPLS-OSPF-BGP, Elements of Transport Protocols, Congestion Control: Desirable bandwidth Allocation-Regulating the Sending Rate

UNIT -5

The Internet Transport Protocols: UDP, The Internet Transport Protocols: TCP, World Wide Web and HTTP, FTP, Electronic Mail, TELNET, Secure Shell (SSH), Domain Name System (DNS)

TEXT BOOKS:

1.Andrew S. Tanenbaum, David J.Wetherall, "**Computer Networks**", Pearson Education, 5th ed., ISBN 978-81-317-8757-1
2. Behrouz A. Forouzan, "**Data Communications and Networking**", McGraw Hill Education, 5th ed., ISBN 978-1-25-906475-3.

REFERENCES:

1. Douglas E. Comer, "**Internetworking with TCP/IP – Principles, protocols, and architecture- Volume 1**", 5th ed., PHI
2. Peterson, Davie,"**Computer Networks**", 5th ed., Elsevier.
3. Chawan- Hwa Wu, Irwin,"**Introduction to Computer Networks and Cyber Security**", CRC Publications.

Computer Networks and Internets with Internet Applications, Comer

III B.Tech II Sem (Common E.C.E. E.E.E and C.S.E)

MICROPROCESSORS & MICROCONTROLLERS

L	T	P	C
3	1	0	3

Course Objectives: This subject deals about the basic 16-bit (8086) processor and an 8-bit (8051) controllers, their architecture, internal organization and their functions, interfacing an external device with the processors/ controllers.

Learning Outcomes: Students are able to

a. Recall and apply a basic concept of digital fundamentals to Microprocessor based personal computer system.
b. Identify a detailed s/w & h/w structure of the Microprocessor.
c. Illustrate how the different peripherals (8255, 8253 etc.) are interfaced with Microprocessor.
d. Distinguish and analyze the properties of Microprocessors & Microcontrollers.
e. Analyze the data transfer information through serial & parallel ports.
f. Train their practical knowledge through laboratory experiments.

UNIT-I: Introduction

Microprocessor based personal computer system, Overview of 8085 Micro Processors: Architecture, Addressing modes, Instruction set, interrupts. Programmer's model for 8086, Segmented memory operation, Instruction set of 8086, Addressing modes supported by 8086 instruction set, Assembly language programming.

UNIT- II: Interfacing with 8086 –Part 1

Memory interface to 8086, Interrupts in 8086, Programming with DOS and BIOS function calls, Parallel and serial data transfer methods, 8255 PPI chip, I/O interface method.

UNIT-III: Interfacing with 8086 – Part 2

Pin diagram detail of 8086, Bus timing, Minimum and Maximum mode of operation, 8259 Interrupt controller, 8237 DMA controller.

UNIT-IV: Introduction to Microcontrollers

Introduction to Micro Controllers 8051, 8096/97, Architecture, Registers, Pin Description, Connections, I/O Ports, Memory Organization, Addressing Modes, Instruction Set.

UNIT–V: Interfacing with Microcontroller

Assembly directives, Simple assembly software programs, Interfacing with keyboards, LEDs, 7 segment LEDs, LCDs, Interfacing with ADCs, Interfacing with DACs.

TEXT BOOKS:

1. J.L. Antonakos, An Introduction to the Intel Family of Microprocessors, Pearson, 1999.
2. Barry B. Brey, The Intel Microprocessors, (7/e), Eastern Economy Edition , 2006.
3. M.A. Mazidi & J.C. Mazidi Microcontroller and Embedded systems using Assembly & C. (2/e), Pearson Education, 2007.

REFERENCES:

1. Kenneth J Ayala, The 8051 Microcontroller, (3/e), Thomson Delmar Learning, 2004.
2. I. Scott MacKenzie and Raphael C.W. Phan. The 8051 Microcontroller.(4/e), Pearson education, 2008.

III B.Tech II Sem (E.C.E)

DIGITAL SIGNAL PROCESSING

L	T	P	C
3	1	0	3

Course Objectives:

1. To use Z transforms and discrete time Fourier transforms to analyze a digital system.
2. To design and analyze simple finite impulse response filters
3. To understand stability of FIR filters
4. To know various structures used in the implementation of FIR and IIR filters
5. Window method design structure for implementation.

Learning Outcomes: At the end of the course, the student should be able to

a. Describe the Sampling Theorem and how this relates to Aliasing and Folding.
b. Determine if a system is a Linear Time-Invariant (LTI) System and Take the Z-transform of a LTI system.
c. Find the frequency response of FIR and IIR filters through analysis.
d. Understand the relationship between poles, zeros, and stability and determine the spectrum of a signal using the DFT, FFT, and spectrogram.
e. Design, analyze, and implement various digital filters.

UNIT-I

Introduction: Review of discrete-time signals and systems–Time domain analysis of discrete-time signals & systems, Frequency domain analysis of discrete-time signals and systems.

Discrete Fourier Transform: Frequency-domain sampling and reconstruction of discrete-time signals, Discrete Fourier Transform (DFT), The DFT as a linear transformation, Relationship of the DFT to other transforms, Properties of DFT, Linear filtering methods based on DFT, Frequency analysis of signals using the DFT.

UNIT-II

Fast Fourier Transform Algorithms (FFTA): Fast Fourier transforms (FFT)-Radix2 decimation in time and decimation in frequency FFT algorithms, inverse FFT and FFT for composite N, Applications of FFT algorithms – Efficient computation of the DFT of two real sequences, 2N point real sequences, Use of the FFT algorithm in linear filtering and correlation, Quantization errors in the computation of DFT.

UNIT-III

Implementation of Discrete-Time Systems: Structures for the realization of discrete-time systems, Structures for FIR systems - Direct form, Cascade form, Frequency sampling, and Lattice structures, Structures for IIR systems – Direct form, Signal flow graphs & Transposed, Cascade form, Parallel form and Lattice structures, Conversion from Lattice structure to direct form, lattice –Ladder structure.

UNIT-IV

Design of Digital Filters: General considerations–Causality and its implications, Characteristics of practical Frequency Selective Filters,

Design of FIR filters–Symmetric and asymmetric FIR filters, Design of linear phase FIR filters using windows, Design of linear phase FIR filters by the frequency sampling method,

Design of IIR filters from analog filters–IIR filter design by approximation of derivatives, by Impulse invariance and by bilinear transformation methods, Frequency transformation in the analog and digital domains, Illustrative problems.

UNIT-V

Multirate Digital Signal Processing: Introduction, Decimation, and interpolation, Sampling rate conversion by a rational factor, Implementation of sampling rate conversion, Multistage implementation of sampling rate conversion, Sampling rate conversion of bandpass signals, Sampling rate conversion by arbitrary factor, Applications of multirate signal processing.

TEXT BOOKS:

1. John G. Proakis, Dimitris G. Manolakis, "Digital signal processing, principles, Algorithms and applications," Pearson Education/PHI, 4th ed., 2007.
2. Sanjit K Mitra, "Digital signal processing, A computer base approach," Tata McGraw Hill, 3rd edition, 2009.

REFERENCES:

1. A.V.Oppenheim and R.W. Schaffer, & J R Buck, "Discrete Time Signal Processing," 2nd ed., Pearson Education, 2012.
2. B. P. Lathi, "Principles of Signal Processing and Linear Systems," Oxford Univ. Press, 2011.
3. Li Tan, Jean Jiang, "Digital Signal Processing, Fundamentals and Applications," Academic Press, Second Edition, 2013.
4. Andreas Antoniou, "Digital Signal Processing," TATA McGraw Hill, 2006.
5. Schaum's outlines M H Hayes, "Digital Signal Processing," TATA Mc-Graw Hill, 2007.
6. A. Anand Kumar, "Digital Signal Processing," PHI Learning, 2011.

III B.Tech II Sem (E.C.E)

MICROWAVE ENGINEERING

L	T	P	C
3	1	0	3

Course Objectives:

1. To analyze micro-wave circuits incorporating hollow, dielectric and planar waveguides, transmission lines, filters and other passive components, active devices.
2. To Use S-parameter terminology to describe circuits.
3. To explain how microwave devices and circuits are characterized in terms of their "S" Parameters.
4. To give students an understanding of microwave transmission lines.
5. To Use microwave components such as isolators, Couplers, Circulators, Tees, Gyrators etc..
6. To give students an understanding of basic microwave devices (both amplifiers and oscillators).
7. To expose the students to the basic methods of microwave measurements.

Learning Outcomes:

At the end of the semester, students are provided learning experiences that enable them to:

a. Analyze micro-wave circuits incorporating hollow, dielectric and planar waveguides, transmission lines, filters and other passive components, active devices.
b. Understand the various principles involved in various Microwave oscillators and amplifiers such as Klystron tubes, TWTs, Magnetrons, Gunn diode etc.
c. Use S-parameter terminology & to describe the characteristics of microwave circuits through scattering parameters.
d. Ability to understanding of microwave transmission lines and how to use microwave components such as isolators, Couplers, Circulators, Tees, Gyrators etc.
e. Set up the microwave benches for measurement of various parameters such as microwave frequency, VSWR, Impedance of unknown load etc.
f. Verify the characteristics of Microwave devices through measurements.

UNIT-I

Waveguides & Resonators: Introduction, Microwave spectrum and bands, applications of Microwaves, Rectangular Waveguides-Solution of Wave Equation in Rectangular Coordinates, TE/TM mode analysis, Expressions for fields, Cutoff frequencies, filter characteristics, dominant and degenerate modes, sketches of TE and TM mode fields in the cross-section, Mode characteristics - Phase and Group velocities, wavelengths and impedance relations, Circular Waveguides - Dominant mode (qualitative treatment only), Rectangular Waveguides – Power Transmission and Power Losses, Impossibility of TEM Modes, losses, Q-factor, Cavity resonators-introduction, Rectangular and cylindrical cavities, dominant modes and resonant frequencies, Q-factor and coupling coefficients, Illustrative Problems.

UNIT-II

Waveguide Components: Scattering Matrix - Significance, Formulation and properties, Coupling mechanisms - Probe, Loop, Aperture types, Wave guide discontinuities - waveguide Windows, tuning screws and posts, matched loads, Waveguide attenuators - Resistive card, rotary vane Attenuators, waveguide phase shifters-dielectric, rotary vane phase shifters, Wave guide multiport junctions - E plane and H plane Tees, Magic Tee, Directional couplers-2 hole, Bothe hole types, Ferrites-composition and characteristics, Faraday rotation, Ferrite components

- Gyrator, Isolator, Circulator, S Matrix calculations for 2-port junction, E plane and H plane Tees, Magic Tee, Directional coupler, circulator and Isolator, Illustrative Problems.

UNIT-III

Linear beam Tubes: Limitations and losses of conventional tubes at microwave frequencies, Classification of Microwave tubes, O type tubes - 2 cavity klystrons-structure, Reentrant cavities, velocity modulation process and Applegate diagram, bunching process and small signal theory-Expressions for o/p power and efficiency, Reflex Klystrons-structure, Velocity Modulation, Applegate diagram, mathematical theory of bunching, power output, efficiency, oscillating modes and o/p characteristics, Effect of Repeller Voltage on Power o/p, Significance, types and characteristics of slow wave structures, structure of TWT and amplification process (qualitative treatment), Suppression of oscillations, Gain considerations.

UNIT - IV

Cross-field Tubes & Microwave Semiconductor Devices: Introduction, Cross field effects, Magnetrons-different types, cylindrical travelling wave magnetron-Hull cutoff and Hartree conditions, modes of resonance and PI-mode operation, separation of PI-mode, O/P characteristics, Introduction to Microwave semiconductor devices, classification, applications, Transfer Electronic Devices, Gunn diode - principles, RWH theory, Characteristics, Basic modes of operation - Gunn oscillation modes, LSA Mode, Varactor diode, Parametric amplifier, Introduction to Avalanche Transit time devices (brief treatment only), Illustrative Problems.

UNIT-V

Microwave Measurements: Description of Microwave bench-different blocks and their features, errors and precautions, Microwave power measurements, Measurement of attenuation, frequency, VSWR (low, medium, high), Measurement of 'Q' of a cavity, Impedance measurements.

<u>TEXT BOOKS:</u>

1. Samuel Y. Liao, "Microwave devices and circuits," Pearson, 3rd Edition, 2003.
2. Herbert J. Reich, J. G. Skalnik, P. F. Ordung and H. L. Krauss, "Microwave principles," CBS publishers and distributors, New Delhi, 2004.

<u>REFERENCES:</u>

1. R. E. Collin, "Foundations for microwave engineering," IEEE press, John Wiley, 2nd Edition, 2002.
2. Om. P. Gandhi, "Microwave Engineering and Applications," Pergamon, 1981.
3. David M. Pozer, "Microwave Engineering," Wiley India Pvt. Ltd., 3rd Edition, 2010.
4. Rajeswari Chatterjee, "Elements of Microwave Engineering," Ellis Horwood Ltd., Publisher, 1986.
5. Peter A.Rizzi, "Microwave Engineering Passive Circuits," PHI, 1999.
6. F. E. Terman, "Electronic and Radio Engineering," McGraw-Hill, 4th Edition, 1995.

III B.Tech II Sem (E.C.E)

ELECTRONIC MEASUREMENTS AND INSTRUMENTATION

L	T	P	C
3	1	0	3

Course Objectives:

1. To study about functioning of different meters associated with measurements of signal characteristics
2. To study and employ CRO for measuring Signal characteristics
3. To study in detail about different bridges employed for Electronic measurements
4. To study working of advanced measuring instruments such as logic analyzers and spectrum analyzers

Learning Outcomes:

After the completion of the course the students will be able to

a. Understand basic principles involved in the meters for measuring voltage, current, resistance, frequency and so on.
b. Employ CRO for measuring voltage, current, resistance, frequency and so on.
c. Understand principles of measurements associated with different bridges.
d. Get complete knowledge regarding working of advanced instruments such as logic analyzers and spectrum analyzers.

UNIT-I

Performance characteristics of Instruments: Static characteristics, Accuracy, Precision, Resolution, Sensitivity, static and dynamic calibration, Errors in Measurement, and their statistical analysis, dynamic characteristics-speed of Response, fidelity, Lag and dynamic error. DC ammeters, DC voltmeters-multirange, range extension/solid state and differential voltmeters, AC voltmeters –multirange, range extension. Thermocouple type RF ammeter, ohm meters, series type, shunt type, multimeter for voltage, current and resistance measurements.

UNIT-II

Oscilloscopes: Standard specifications of CRO,CRT features, derivation of deflection sensitivity, vertical and horizontal amplifiers, horizontal and vertical deflection systems, sweep trigger pulse, delay line, sync selector circuits, probes for CRO – active, passive, and attenuator type, triggered sweep CRO, and Delayed sweep, dual trace/beam CRO, Measurement of amplitude, frequency and phase (Lissajous method).Principles of sampling oscilloscope, storage oscilloscope, and digital storage oscilloscope, Digital frequency counters, time & Period measurements.

UNIT-III

Signal generator-fixed and variable, AF oscillators, function generators, pulse, random noise, sweep, and arbitrary waveform generators, their standards, specifications and principles of working (Block diagram approach).Wave analyzers, Harmonic distortion analyzers, Spectrum analyzers, and Logic analyzers.

UNIT-IV

Review of DC Bridges: Wheatstone bridge, Wein Bridge, errors and precautions in using bridges, AC bridges: Measurement of inductance-Maxwell's bridge, Anderson Bridge. Measurement of capacitance- Schearing Bridge. Kelvin Bridge, Q-meter, EMI and EMC, Interference and noise reduction techniques.

UNIT-V

Sensors and Transducers - Active and passive transducers: Measurement of displacement (Resistance, capacitance, inductance; LVDT) Force (strain gauges) Pressure (piezoelectric transducers) Temperature (resistance thermometers, thermocouples, and thermistors), Velocity, Acceleration, Vibration, pH measurement Signal Conditioning Circuits.

TEXT BOOKS:

1. A.D. Helfrick and W.D. Cooper, "Modern Electronic Instrumentation and Measurement Techniques", PHI, 5th Edition, 2002.
2. K. Lal Kishore, "Electronic Measurements & Instrumentations", Pearson Education, 2009.

REFERENCES:

1. H.S.Kalsi, "Electronic instrumentation", second edition, Tata McGraw Hill, 2004.
2. Ernest O Doebelin and Dhanesh N Manik, "Measurement Systems Application and Design", TMH, 5th Edition, 2009.
3. Oliver and Cage, "Electronic Measurement and Instrumentation", TMH.
4. Robert A.Witte, "Electronic Test Instruments, Analog and Digital Measurements", Pearson Education, 2nd Ed., 2004.
5. David A. Bell, "Electronic Instrumentation & Measurements", PHI, 2nd Edition, 2003.

B.Tech. III –II Semester

NANOMATERIALS AND ENGINEERING APPLICATIONS
(Choice Based Credit Course Inter Department)
(Common to all branches)

L	T	P	C
3	1	0	3

Objectives:

i) to be able to critically evaluate nanotechnology concepts and therefore be equipped to develop deeper into research.

ii) Acquire knowledge of basic significance of TEM, Nanosemiconductors, nanopolymers and nanocomposites towards Engineering applications.

iii) Understand and describe the use of unique properties of nanoscale structures for various applications.

iv) Understand the physical and chemical properties of carbon based nanostructures.

UNIT -1: Nano Structures: Zero, one –two and three dimensional structures , size control of metal nano particles and their properties- optical, electronic, magnetic properties- surface Plasmon resonance- change of band gap-applications, catalysis, electronic devices

UNIT-II: Carbon Nanostructures: DLCs, fullerences, C-60, C-80, single walled nanotube (SWNT) and Multi Walled nanotuebs (MWNT) properties-mechanical, optical and electrical properties.

UNIT-III: Thermo electric materials (TEM): concept of phonon, thermal conductivity, specific heat, exothermic and endothermic processes. Bulk TEM properties, different types of TEM; one dimensional TEM; composite TEM; applications.

UNIT-IV: Nano semiconductors: Nanoscale electronic devices including CMOS, potentiometric sensors etc., MRAM devices, spintronic devices including spin values.

UNIT-V: Nanopolymers; preparation of and characterization of diblock Copolymer based nanocomposites, nanoparticles polymer ensembles; applications of nanopolymers in catalysis. Nano Composites: metal-metal nano composites, polymer-metal nanocomposites, ceramic nanocomposites: Dielectric and CMR based nanocomposites.(one example for each type)

TEXT BOOKS

1. Physics of Magnetism – S. Chikazumi and S. H. Charap., John Wiley and Sons, 1964.
2. Physical Properties of Carbon nanotube - R. Satio, 5th Edition, Imperial College Press,2004. ISBN-13: 978-1860942235
3. Nanoscale materials – Liz Marzan and Kamat, Springer, 2003, ISBN 978-0-306-48108-6.

REFERENCES:

1. Novel nanocrystalline Alloys and Magnetic nanomaterials – Brain Cantor, 1st Edition, CRC Press, 2004,   ISBN-13: 978-0750310024
2. Polymer nanocomposites: Edited by Yiu-Wing Mai and Zhong, Znen Yu, 1st edition, Woodhead Publishing Limited and CRC Press LLC, USA.2006,
3. Physics of Magnetism – S. Chikazumi and S. H. Charap., John Wiley and Sons, 1964.
4. Magnetostriction and Magnetomechanical Effects – E. W. Lee, IOP Science, Rep. Prog. Phys. 18 184 doi:10.1088/0034-4885/18/1/305 1955.
5. Carbon Nanotubes: Properties and Applications – Michael J. O'Connel, 1st Edition, Taylor & Francis, 2006.
6. Carbon nanotechnology – Liming Dai, Science Direct. ISBN: 978-0-444-51855-2
7. Nanotubes and Nanowires – CNR Rao and A Govindaraj, 2nd Edition, RSC Publishing, 2011.
8. CRC Handbook of thermoelectric, Ed. Cr Rowe., 1st Edition, CRC Press, 2001.

Outcomes:

- Students will have a sound knowledge in multidisciplinary areas of nanotechnology.
- The necessary foundation for future nanomaterials engineering.
- Recognize the role of carbon based nanomaterials, TEM, Nanosemiconductors, nanopolymers and nanocomposites towards Engineering applications.
- Techniques to characterize, design and validate nano devices

B.Tech. III –II Semester

GREEN CHEMISTRY AND CATALYSIS FOR SUSTAINABLE ENVIRONMENT
(Choice Based Credit Course Inter Department)

L	T	P	C
3	1	0	3

Course Objectives:

- Learn an interdisciplinary approach to the scientific and societal issues arising from industrial chemical production, including the facets of chemistry and environmental health sciences that can be integrated to promote green chemistry and the redesign of chemicals, industrial processes and products.
- Understand the use of alternatives assessments that combine chemical, environmental health, regulatory, and business considerations to develop safer products.

UNIT 1: Principles and Concepts Of Green Chemistry

Introduction, Green chemistry Principles, sustainable development and green chemistry, atom economy, atom economic: Rearrangement and addition reactions and un-economic reactions: Substitution, elimination and Wittig reactions, Reducing Toxicity. Waste - problems and Prevention: Design for degradation, Polymer recycling.

UNIT 2: Catalysis and Green Chemistry

Introduction to catalysis, Heterogeneous catalysts: Basics of Heterogeneous Catalysis, Zeolites and the Bulk Chemical Industry, Heterogeneous Catalysis in the Fine Chemical and Pharmaceutical Industries, Catalytic Converters, Homogeneous catalysis: Transition Metal Catalysts with Phosphine Ligands, Greener Lewis Acids, Asymmetric Catalysis, Heterogenising the Homogenous catalysts, Phase transfer catalysis: Hazard Reduction, C–C Bond Formation, Oxidation Using Hydrogen Peroxide, Bio-catalysis and photo-catalysis with examples.

UNIT 3: Organic Solvents: Environmentally Benign Solutions

Organic solvents and volatile organic compounds, solvent free systems, supercritical fluids: Super critical carbondioxide, super critical water and water as a reaction solvent: water based coatings, Ionic liquids as catalyst and solvent
.

UNIT 4: Emerging Greener Technologies and Alternative Energy Sources

Biomass as renewable resource, Energy: Fossil Fuels, Energy from Biomass, Solar Power, Other Forms of Renewable Energy, Fuel Cells, Chemicals from Renewable feedstocks: Chemicals from Renewable Feedstocks: Chemicals from Fatty Acids, Polymers from Renewable Resources, Some Other Chemicals from Natural Resources, Alternative Economies: The Syngas Economy, The Biorefinery, Design for energy efficiency: Photochemical Reactions: Advantages of and Challenges Faced by Photochemical Processes, Examples of Photochemical Reactions, Chemistry Using Microwaves: Microwave Heating, Microwave-assisted Reactions, Sonochemistry: Sonochemistry and Green Chemistry, Electrochemical Synthesis: Examples of Electrochemical Synthesis. Industrial applications of alternative environmentally benign catalytic systems for carrying out the important reactions such as selective oxidation, reduction and C-C bond formations (specific reactions).

UNIT 5: Green Processes for Green Nanoscience

Introduction and traditional methods in the nanomaterials synthesis, Translating green chemistry principles for practicing Green Nanoscience. Green Synthesis of Nanophase Inorganic Materials and Metal Oxide Nanoparticles: Hydrothermal Synthesis, Reflux Synthesis, Microwave-Assisted Synthesis, Other methods for Green synthesis of metal and metal oxide nanoparticles, Green chemistry applications of Inorganic nanomaterials

TEXT BOOKS :

1. M. Lancaster, Green Chemistry an introductory text, Royal Society of Chemistry, 2002.
2. Paul T. Anastas and John C. Warner, Green Chemistry Theory and Practice, 4th Edition, Oxford University Press, USA

REFERENCES :

1. Green Chemistry for Environmental Sustainability, First Edition, Sanjay K. Sharma and Ackmez Mudhoo, CRC Press, 2010.
2. Edited by Alvise Perosa and Maurizio Selva , Hand Book of Green chemistry Volume 8: Green Nanoscience, wiley-VCH, 2013.

Course Outcomes:

Upon completion of this course the students should recognize and acquire green chemistry concepts and apply these ideas to develop respect for the inter connectedness of our world and an ethic of environmental care and sustainability.

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B.Tech. III –II Semester

INSTRUMENTAL METHODS OF CHEMICAL ANALYSIS
(Choice Based Credit Course Inter Department)

L	T	P	C
3	1	0	3

Course Objectives:

- To understand the principles of different instruments
- To apply the instruments for analysis of various species in different matrices
- To apply instrumental methods for framing project works

UNIT – I: Molecular Spectrophotometry

Absorption spectra, Lamberts Law, Beer's Law - Combined law equation; Derivations from Beer's Law. Block diagram of a uv- visible spectrophotometer – quantitative analysis ; Direct method for the determination of metal ions; Chromium, Manganese, Iron etc in alloys.

UNIT – II: Infrared Spectroscopy

Interaction of infra-red radiation with molecules, Sources of IR Radiation ; Spectral regions; Block diagram of IR Spectrometer , Function of each component; Sampling Techniques; Application of IR Spectroscopy to functional group analysis (-OH, -NH_2, -CHO, -CO-R, -CONH).

UNIT III: Chromatography

Gas Chromatography: Principles of Gas Chromatography, block diagram of gas chromatograph, Function of each component, Detectors (FID, ECD), stationary phase for column, mobile phase, chromatogram, qualitative analysis, quantitative analysis, retention time, retention volume, capacity factor, area., normalization method. Analysis of gaseous and volatile impurities.

HPLC: Principles of high performance liquid chromatography, Block diagram of HPCL, Systems, functions of each component, stationary phases, eluting solvents, pumps, detectors, quantitative applications of HPLC for environmental analysis.

UNIT IV: Atomic Spectrophotometry

Principle of atomization, atomic absorption spectrometer, applications for metal ions, Atomic emission, application and principle of ICP-OES, X-ray fluorescence spectrometry- Applications

UNIT V: Thermal methods of analysis

TGA- Thermo Gavimetry – Principle, instrumentation and applications
DTA- Differential Thermal Analysis- Principle, instrumentation and applications
DSC- Differential Scanning Coulometry- Principle, instrumentation and applications

TEXT BOOK:

1. Principles of Instrumental Analysis, 6th Edition, Douglas A. Skoog, James Holler. J, Stanley R. Crouch, Cengage Learning, New Delhi, 2014.
2. Instrumentaiotn methods of analysis, Chatwal & Anand, Himalaya Publ;ications, 2003

REFERENCES:

1.Instrumental methods of analysis, Willand merrit and dean, caps publications & Distribution, 1999.
2.Vogels Text book of Quantitative chemical analysis, 6th edition ,Mendham J, Denny R.C,Barnes J.D, Thomas M.J.K, pearson education, 2002.
3.Modern Analytical Chemistry, 1St edition, David Harvey, McGraw-Hill Higher Education, 2010.

Course Outcomes: Upon successful completion of this course, the students will be able to:

1. Differentiate between classical and instrumental methods of Chemical analysis.
2. Apply different types of Instrumental methods for analysis of various samples in water and other environmental samples

B.Tech. III –II Semester

CHEMISTRY OF NANOMATERIALS AND APPLICATIONS
(Choice Based Credit Course Inter Department)

Course Objectives:

- To understand synthetic principles of Nanomaterials by various methods
- And also characterisae the synthetic nanomaterials by various instrumental methods
- To enumerate the applications of nanomaterials in engineering

UNIT I:

Introduction**:**Scope of nanoscience and nanotecnology, nanoscience in nature, classification of nanostructured materials, importance of nano materials.

Synthetic Methods**:** Bottom-Up approach**:-** Sol-gel synthesis, microemulsions or reverse micelles, co-precipitation method, solvothermal synthesis, hydrothermal synthesis, microwave heating synthesis and sonochemical synthesis.

UNIT-II

Top-Down approach**:-** Inert gas condensation, arc discharge method, aerosol synthesis, plasma arc technique, ion sputtering, laser ablation, laser pyrolysis, and chemical vapour deposition method, electrodeposition method, high energy ball milling.

UNIT-III

Techniques for characterization**:** Diffraction technique, spectroscopy techniques, electron microscopy techniques for the characterization of nanomaterilas, BET method for surface area analysis, dynamic light scattering for particle size determination.

UNIT-IV

Studies of Nano-structured Materials**:** Synthesis, properties and applications of the following nanomaterials, fullerenes, carbon nanotubes, core-shell nanoparticles, nanoshells, self-assembled monolayers, and monolayer protected metal nanoparticles, nanocrystalline materials, magnetic nanoparticles and important properties in relation to nanomagnetic materials, thermoelectric materials, non-linear optical materials, liquid crystals.

UNIT.V

Engineering Applications of Nanomaterials

TEXT BOOKS:

1. **NANO: The Essentials :** T Pradeep, MaGraw-Hill, 2007.
2. **Textbook of Nanoscience and nanotechnology:** B S Murty, P Shankar, Baldev Rai, BB Rath and James Murday, Univ. Press, 2012.

REFERENCE BOOKS:

1. Concepts of Nanochemistry; Ludovico Cademrtiri and Geoffrey A. Ozin & Geoffrey A. Ozin, Wiley-VCH, 2011.
2. **Nanostructures & Nanomaterials; Synthesis, Properties & Applications:** Guozhong Cao, Imperial College Press, 2007.
3. **Nanomaterials Chemistry**, C. N. R. Rao, Achim Muller, K.Cheetham, Wiley-VCH, 2007.

Course Out Come

At the end of the course, the student will be able to:

- Understand the state of art synthesis of nano materials
- Characterize nano materials using ion beam, scanning probe methodologies, position sensitive atom probe and spectroscopic ellipsometry.
- Analyze nanoscale structure in metals, polymers and ceramics
- Analyze structure-property relationship in coarser scale structures
- Understand structures of carbon nano tubes

B.Tech. III –II Semester

MATHEMATICAL MODELING AND SIMULATION
(Choice Based Credit Course Inter Department)

L	T	P	C
3	1	0	3

Objectives:

- This course aims at providing the basic knowledge to understand a Mathematical model and formulate a Mathematical model related to a real word problems of engineering, biological science etc.

Prerequisite: Instructor's permission

UNIT – I

Mathematical Model, types of Mathematical models and properties, Procedure of modeling,

UNIT – II

Graphical method: Barterning model, Basic optimization, Basic probability: Monte-Carlo simulation,

UNIT – III

Approaches to differential equation: Heun method, Local stability theory: Bernoulli Trials, Classical and continuous models, Case studies in problems of engineering and biological sciences.

UNIT – IV

General techniques for simulating continuous random variables, simulation from Normal and Gamma distributions, simulation from discrete probability distributions

UNIT – V

simulating a non – homogeneous Poisson Process and queuing system.

TEXT BOOKS:

1. Edward A. Bender.. An Introduction to Mathematical Modeling.
2. J. N. Kapoor.. Mathematical Modeling, Wiley eastern Limited.

REFERENCES:

1. A. C. Fowler.. Mathematical Models in Applied Sciences, Cambridge University Press.
2. S.M. Ross ..Simulation, India Elsevier Publication.
1. A.M.Law and W.D.Kelton.. Simulation Modeling and Analysis, T.M.H. Edition.

Outcomes: The student will be able to analyze the real word problem through the technique of modeling of that problem to have better insight of the real word problem.

OPTIMIZATION TECHNIQUES
(Choice Based Credit Course Inter Department)

L	T	P	C
3	1	0	3

Objectives:

- This course aims at providing the student with the basic concepts and several methods of optimization .

Prerequisite: Instructor's permission

UNIT – I

Convex sets and functions, constrained optimization methods: Introduction, Kuhn-Tucker conditions, convex optimization, Lagrange multipliers.

UNIT – II

Non-linear programming: One-dimensional minimization method, seach method, unconstrained and constrained optimization theory and practices.

UNIT – III

Reliability: Basic concepts, conditional failure rate function, Failure time distributions, Certain life models, Reliability of a system in terms of the reliability of it's components, series system, Parallel system.

UNIT – IV

Dynamic Programming: Multistage decision problems, computation procedure and case studies.

UNIT – V

Fundamentals of queuing system, Poisson process, the birth and death process, special queuing methods.

TEXT BOOKS:

1. S.S Rao.. Optimization: Theory and Practices, New Age Int. (P) Ltd. Publishers, New Delhi.
2. Chong, E.K.P.and Zak, S. H.. An Introduction to Optimization, John Wiley & Sons, N.Y.
3. Peressimi A.L., Sullivan F.E., Vhl, J.J..Mathematics of Non-linear Programming, Springer – Verlag.

Outcomes: The student will be able to analyze optimization problems in engineering and technology using various elegant optimization technique.

B.Tech. III –II Semester

CAMPUS RECRUITMENT TRAINING & SOFT SKILLS
(Choice Based Credit Course Inter Department)

L	T	P	C
3	1	0	3

Objectives:
1. To develop awareness in students of the relevance and importance of soft skills.
2. To provide students with interactive practice sessions to make them internalize soft skills.
3. To prepare the students for placements.
4. To train students to use language appropriately for interviews, group discussion and public speaking
5. To help the students to understand interpersonal skills.
6. To support them in building interpersonal skills.
7. To better the ability to work with others

Outcome:
After completing this course,
- The students would have Understood of what Soft Skills is,
- Understood the significance of soft skills in the working environment
- Turning out engineering students with a clear concept of soft skills and equipping them with readiness to implement them at work place.

SYLLABUS:
UNIT I: Interview Dynamics-Preparation-Power Selling- Cracking the top Questions- Stress Control.
UNIT II: Intra Personal Skills: Knowing Strengths & Weaknesses – Goal Setting-Quotient Skills- Positive thinking- Problem Solving-analytical Skills.
UNIT III: Intra Personal Skills: Managerial Skills, Group dynamics- Negotiation Skills- Time Management.
UNIT IV: Verbal Skills: Dynamics of listening, Speaking, Reading & Writing skills- Email writing.
UNIT V: Non Verbal Skills: Body Language-Body Posture, Gestures, Eye Contact, Facial Expressions,Appearance, Space Distance /Proxemics , Touch/Haptics,. Para Language-Tone, Pace, Pause, Volume , Quality**.**

Reference books:

1. M. Ashraf Rizvi: Effective Technical Communication, Tata McGraw Hill, New Delhi, 2014.
2. Alex.k, soft skills, 3rd ed. S. Chand Publication, New Delhi, 2014.
3. Technical Communication, Principle and Practice, Meenakshi Raman and Sangita Sharma, OUP, 2009.
4. Sherfield, M. Robert at al Cornerstone Developing Soft Skills, 4th ed. Pearson Publication,
New Delhi, 2014.
5. Shalini Varma, Body Language for your success mantra, 4th ed, S. Chand Publication, New Delhi, 2014.

B.Tech. III –II Semester

COMPETITIVE & SPOKEN ENGLISH.
(Choice Based Credit Course Inter Department)

L	T	P	C
3	1	0	3

Objectives:

- To train students to use language effectively in everyday conversations, to participate in group discussions, to help them face interviews, and sharpen public speaking skills
- To help the second language learners to acquire fluency in spoken English and neutralize mother tongue influence.
- To enable them to learn better pronunciation through stress on word accent, intonation, and rhythm.
- To train students to use language appropriately for interviews, group discussion and public speaking
- To improve the students' fluency in English, through a well-developed vocabulary and enable them to listen to English spoken at normal conversational speed by educated English speakers and respond appropriately in different socio-cultural and professional contexts.
- Further, they would be required to communicate their ideas relevantly and coherently in writing.

Expected Outcomes:

- Becoming active participants in the learning process and acquiring proficiency in spoken English of the students.
- Speaking with clarity and confidence thereby enhancing employability skills of the students.
- Accomplishment of sound vocabulary and its proper use contextually
- Flair in Writing and felicity in written expression.
- Enhanced job prospects.
- Effective Speaking Abilities.

SYLLABUS:

UNIT I: Creating the unknowing passage-Reading Comprehension- Listening Comprehension.

UNIT II: Correction of the Sentences Nouns – Pronouns – Verbs- Tenses- Articles-Prepositions- Sentences.

UNIT III: Competitive Vocabulary – Word Building – Memory techniques

UNIT IV: Functional English – Sentences – Construction – Neutralization of accent – Intonation.

UNIT V: Dynamics of Speaking – Communication Skills – Speech Preparation – Speaking Practices.

Reference books:

1. M. Ashraf Rizvi: **Effective Technical Communication**, Tata McGraw Hill, New Delhi, 2014.
2. Wren and Martin, **High School English Grammar and Composition,**S. Chand Publication, New Delhi, 2014.
3. Hari Mohan Prasad, **Objective English for Competitive Examination,**Tata McGraw Hill, New Delhi, 2014.
4. R.S. Aggarwal , **Objective General English**, S. Chand Publication, New Delhi.
5. R.K Bansal, **Spoken English : Manual of Speech and Phonetics**,4th Edition, Orient Black swan Pvt Ltd.-New Delhi, 2013.

B.Tech III – II Semester

GREEN BUILDINGS
(Choice Based Credit Course Inter Department)

L	T	P	C
3	1	0	3

Course Objective:
To enable the students learn to reduce the overall impact of the built environment on human health and natural environment. Student will able to learn how to reduce waste, pollution and environmental degradation and also to understand how to use effectively energy, water and other resources.

Unit I Introduction :Concept of Green Building, Need for Green Building, Benefits of Green Buildings, Green Building Materials and Equipment in India, Key Requisites for Constructing a Green Building, Important Sustainable features for Green Building,

Unit-II Green Building Concepts and Practices Indian Green Building Council, Green Building Moment in India, Benefits Experienced in Green Buildings, Launch of Green Building Rating Systems, Residential Sector, Market Transformation;

Green Building Opportunities And Benefits: Opportunities of Green Building, Green Building Features, Material and Resources, Water Efficiency, Optimum Energy Efficiency, Typical Energy Saving Approach in Buildings, LEED India Rating System and Energy Efficiency,

Unit-III Green Building Design Introduction, Reduction in Energy Demand, Onsite Sources and Sinks, Maximise System Efficiency, Steps to Reduce Energy Demand and Use Onsite Sources and Sinks, Use of Renewable Energy Sources. Ecofriendly captive power generation for factory, Building requirement,

Unit IV Air Conditioning Introduction,CII Godrej Green business centre,Design philosophy,Design interventions,Energy modeling, HVAC System design,Chiller selection,pump selection,Selection of cooling towers,Selection of air handing units,Precooling of fresh air,Interior lighting system,Key feature of the building. Eco-friendly captive power generation for factory,Building requirement.

Unit-V Material Conservation Handling of non process waste, waste reduction during construction,materials with recycled content,local materials,material reuse,certified wood ,Rapidly renewable building materials and furniture; Indoor Environment Quality And Occupational Health: Air conditioning, Indore air quality, Sick building syndrome, Tobacco smoke control, Minimum fresh air requirements avoid use of asbestos in the building, improved fresh air ventilation, Measure of IAQ, Reasons for poor IAQ, Measures to achieve Acceptable IAQ levels,

Text Books:
1. Handbook on Green Practices published by Indian Society of Heating Refrigerating and Air conditioning Engineers, 2009.
2. Green Building Hand Book by Tomwoolley and Samkimings, 2009.

Reference Books:
1. Complete Guide to Green Buildings by Trish riley
2. Standard for the design for High Performance Green Buildings by Kent Peterson, 2009

B.Tech III – II Semester

DISASTER MANAGEMENT AND MITIGATION
(Choice Based Credit Course Inter Department)

L	T	P	C
3	1	0	3

Course Objective:
To know the various types of disaster caused by the nature and disaster prone areas in India. To have knowledge about the response of the structure for various disasters. To obtain a brief knowledge about the planning and preparedness for a disaster. To have knowledge about the various modern materials and tools in disaster reduction.

UNIT I - Introduction To Disaster :Meaning, Nature, Importance of Hazard, Risk, Vulnerability and Disaster- Dimensions & Scope of Disaster Management - India's Key Hazards – Vulnerabilities - National disaster management framework - Disaster Management Cycle.

UNIT II - Natural Disaster : Natural Disasters- Meaning and nature of natural disaster; their types and effects. Floods, drought, cyclone, earthquakes, landslides, avalanches, volcanic eruptions, Heat and cold waves, Climatic change: global warming, Sea level rise, ozone depletion.

UNIT III - Anthropogenic Disaster :Man Made Disasters- Nuclear disasters, chemical disasters, biological disasters, building fire, coal fire, forest fire, oil fire, air pollution, water pollution, deforestation and industrial waste water pollution.

UNIT IV - Approaches In Disaster Management :Pre- disaster stage (preparedness) - Preparing hazard zonation maps, Predictability/ forecasting & warning - Preparing disaster preparedness plan - Land use zoning - Preparedness through Information, education. Emergency Stage - Rescue training for search & operation - Immediate relief - Assessment surveys. Post Disaster stage – Rehabilitation - Social Aspect - Economic Aspect and Environmental Aspect.

UNIT V - Disaster Mitigation : Meteorological observatory - Seismological observatory - Hydrology Laboratory and Industrial Safety inspectorate. Technology in Disaster Management - Emergency Management Systems (EMS) in the Disaster Management Cycle - Remote Sensing and Geographic Information Systems(GIS) in Disaster Management. 2

Text book:

Sharma.S.R, "Disaster management", A P H Publishers, 2011.

REFERENCES

1. VenuGopalRao.K, "Geoinformatics for Disaster Management", Manglam Publishers and Distributors, 2010.
2. Singh.R.B, "Natural Hazards and Disaster Management: Vulnerability and Mitigation", Rawat Publications, 2006.
3. Gupta.H.K, "Disaster Management", University Press, India, 2003.
4. Gupta.M.C, "Manuals on Natural Disaster management in India", National Centre for Disaster Management,IIPA, New Delhi, 2001.

B.Tech III-II Semester

RENEWABLE ENERGY SOURCES
(Choice Based Credit Course Inter Department)

L	T	P	C
3	1	0	3

Course objectives:

1. To understand processing and limitations of fossil fuels (coal, petroleum and natural gas)
2. To know the necessity of harnessing alternate energy resources such as solar, wind, nuclear, geothermal, tidal and biomass.
3. To understand and practice various characterization techniques for different renewable fuels.
4. To do the design and analysis practice for solar, wind systems.

UNIT-I:

Photo voltaic power generation ,spectral distribution of energy in solar radiation, solar cell configurations, voltage developed by solar cell, photo current and load current, practical solar cell performance, commercial photo voltaic systems, test specifications for PV systems, applications of super conducting materials in electrical equipment systems.

UNIT-II:

Principles of MHD power generation, ideal MHD generator performance, practical MHD generator, MHD technology.

Wind Energy conversion: Power from wind, properties of air and wind, types of wind Turbines, operating characteristics.

UNIT-III:

Tides and tidal power stations, modes of operation, tidal project examples, turbines and generators for tidal power generation.

Wave energy conversion: properties of waves and power content, vertex motion of Waves, device applications. Types of ocean thermal energy conversion systems Application of OTEC systems examples,

UNIT-IV:

Miscellaneous energy conversion systems: coal gasification and liquefaction, biomass conversion, geothermal energy, thermo electric energy conversion, principles of EMF generation, description of fuel cells, Co-generation and energy storage, combined cycle co-generation, energy storage.

Global energy position and environmental effects: energy units, global energy position.

UNIT-V:

Types of fuel cells, H_2-O_2 Fuel cells, Application of fuel cells – Batteries, Description of batteries, Battery application for large power. Environmental effects of energy conversion systems, pollution from coal and preventive measures steam stations and pollution, pollution free energy systems.

TEXT BOOKS:

1. "Energy conversion systems" by Rakosh das Begamudre, New age International publishers, New Delhi - 2000.
2. "Renewable Energy Resources" by John Twidell and Tony Weir, 2nd Edition, Fspon & Co

B.Tech III-II Semester

POWER ELECTRONICS
(Choice Based Credit Course Inter Department)

L	T	P	C
3	1	0	3

Objective:

With the advent of semiconductor devices, revolution is taking place in the power transmission distribution and utilization. This course introduces the basic concepts of power semiconductor devices, converters and choppers and their analysis.

UNIT – I Power Semi Conductor Devices

Semiconductor Power Diodes, Thyristors – Silicon Controlled Rectifiers (SCR's) – BJT – Power Transistor - Power Mosfet – Power IGBT - TRIACs, GTOs - Characteristics and Principles of Operation and other Thyristors – Basic Theory of Operation of SCR – Static Characteristics – Turn On and Turn Off Methods- Dynamic Characteristics of SCR - Two Transistor Analogy – Triggering Circuits—— Series and Parallel Connections of SCR's – Snubber Circuits – Specifications and Ratings of SCR's, BJT, IGBT - Numerical Problems –Commutation Circuits.

UNIT – II Phase Controlled Converters

Phase Control Technique – Single Phase Line Commutated Converters – Mid Point and Bridge Connections – Half Controlled Converters, Fully Controlled Converters with Resistive, RL Loads and RLE Load– Derivation of Average Load Voltage and Current – Line Commutated Inverters -Active and Reactive Power Inputs to the Converters without and with Free Wheeling Diode, Effect of Source Inductance – Numerical Problems.

Three Phase Line Commutated Converters – Three Pulse and Six Pulse Converters – Mid Point and Bridge Connections - Average Load Voltage with R and RL Loads – Effect of Source Inductance–Dual Converters (Both Single Phase and Three Phase) - Waveforms –Numerical Problems.

UNIT – III Dc – Dc Converters

Buck converters, boost converters and buck boost converters. Steady state analysis, voltage and current ripple, design of inductor and capacitor values.

UNIT – IV Inverters

Inverters – Single Phase Inverter – Basic Series Inverter – Basic Parallel Capacitor Inverter Bridge Inverter – Waveforms –sine-triangle PWM, Three Phase VSI in 120^0 And 180^0 Modes of Conduction. unipolar, bipolar inverter PWM techniques selective harmonic elimination - Voltage Control Techniques for Inverters Pulse Width Modulation Techniques – Numerical Problems,

UNIT – V AC Voltage Controllers & Cyclo Converters

AC Voltage Controllers – Single Phase Two SCR's in Anti Parallel – With R and RL Loads – Modes of Operation of Triac – Triac with R And RL Loads – Derivation of RMS Load Voltage, Current and Power Factor Wave Forms –Firing Circuits -Numerical Problems - Thyristor Controlled Reactors; Switched Capacitor Networks.

Cyclo Converters – Single Phase Mid Point Cyclo Converters With Resistive and Inductive Load (Principle of Operation only) – Bridge Configuration Of Single Phase Cyclo Converter (Principle of Operation only) – Waveforms

Text Books:

1. Power Electronics – by M. D. Singh & K. B. Kanchandhani, Tata Mc Graw – Hill Publishing company, 1998.
2. Power Electronics : Circuits, Devices and Applications – by M. H. Rashid, Prentice Hall of India, 2nd edition, 1998

Reference Books:

1. Power Electronics – by P.S.Bimbra, Khanna Publications.
2. Power electronics, Essentials and applications – L.Umanand Wiley Publications
3. Power Electronics – by Vedam Subramanyam, New Age International (P) Limited, Publishers
4. Power Electronics - by V.R.Murthy , 1st edition -2005, OXFORD University Press
5. Power Electronics-by P.C.Sen,Tata Mc Graw-Hill Publishing.
6. The power electronics (hand book) : Timothy L.Skgarnina

B.Tech III-II Semester

ELECTRICAL ENERGY MANAGEMENT AND CONSERVATION
(Choice Based Credit Course Inter Department)

L	T	P	C
3	1	0	3

Course objectives:

1. To Understanding, analysis and application of electrical energy systems
2. To acquire the knowledge regarding energy conservation methods and its management.
3. Able to calculate Energy Efficiency, Energy accounting, monitoring and control.
4. To do Specific Energy Consumption; ECO assessment and Evaluation methods, Case study.

UNIT-I

Induction Motors – Three Phase - Cage motors - Equivalent circuit - Speed - torque characteristics - Performance characteristics - voltage unbalance - over motoring - slip ring induction motor characteristics multi speed motors - Single Phase Induction Motors - Starting & running performance - Split phase - Capacitor type motors - Characteristics - Reluctance motors – Universal motors – Stepper motor – Servo motor – Characteristics - Applications

UNIT-II

Energy Efficient Motors - Constructional details - Factors affecting efficiency - Losses distribution - Characteristics - Calculation of R.M.S rating - Power Factor – Causes and disadvantages of low power factor – Methods to improve p.f – Economics of power factor improvement - Simple pay back method - Return on investment - Life cycle analysis.

UNIT-III

Energy efficient lighting - Terminology - Cosine law of luminance - Types of lamps - Characteristics - Design of illumination systems - Good lighting practice - Lighting control - Steps for lighting energy conservation.

UNIT-IV

Economics of Electrical Energy Generation, Audit and Distribution: Definitions - Connected load, Maximum demand - Demand factor – Diversity factor – Significance - Load curve – Load sharing between base load and peak loads - Electrical Energy Audit: Check List – Data Collection – Data Analysis – Case Studies - Electrical Distribution: Electrical load analysis - types of consumers & tariffs - line losses - corona losses - types of distribution system - Kelvin's law - loss load factor.

UNIT-V

Economics Of Electrical Drives - Selection of motors - types of loads - Energy Consumption during starting of a.c and d.c motors - Braking of d.c and a.c motors - Plugging - Regenerative braking – Applications of different electric drives.

TEXT BOOKS:

1. Energy Efficient Electrical motors / John C.Andreas / Marcel Dekker Inc.
2. Generation,Distribution&Utilization of Electrical Energy /CLWadhwa /Wiley Eastern ltd

REFERENCE BOOKS:

1. Electrical Machines /Bimbra / Khanna Publishers
2. Electrical Machinery / Fitzgerland, Kingsley, Kusko / Mc Graw Hill Ltd
3. Electrical Machines/ S.K.Bhattacharya
4. Electrical Machines /I.J.Nagarath and D.P.Kothari / TMH
5. Electrical Technology/ Edward Hughes / ELBS.

Energy Management and good lighting practice: Fuel Efficiency Booklet 12 / EEO

III B.Tech II Semester

ROBOTICS
(Choice Based Credit Course Inter Department)

L	T	P	C
3	1	0	3

Course objectives

- To design, develop and complete robotic activities and challenges
- This course aims at providing the students the fundamental knowledge of the various subscriptions such as kinematics, Dynamics, controls, sensors, actuators, etc.
- It is aimed to provide adequate background in both analysis and design of robots.

UNIT – I

Fundamentals of Robots: Introduction, definition, classification and history of robotics, robot characteristics and precision of motion, advantages, disadvantages and applications of robots. Introduction to matrix representation of a point in a space a vector in space, a frame in space, Homogeneous transformation matrices, representation of a pure translation, pure rotation about an axis.

UNIT – II

Kinematics of robot: Forward and inverse kinematics of robots- forward and inverse kinematic equations for position and orientation, Denavit-Hartenberg(D-H) representation of forward kinematic equations of robots, The inverse kinematic of robots, Degeneracy and Dexterity, simple problems with D-H representation.

Differential motions and Velocities: Introduction, differential relationship, Jacobian, differential motions of a frame-translations, rotation, rotating about a general axis, differential transformations of a frame. Differential changes between frames, differential motions of a robot and its hand frame, calculation of Jacobian, relation between Jacobian and the differential operator, Inverse Jacobian.

UNIT – III

Control of Manipulators: Open- and Close-Loop Control, the manipulator control problem, linear control schemes, characteristics of second-order linear systems, linear second-order SISO model of a manipulator joint, joint actuators, partitioned PD control scheme, PID Control Scheme, computer Torque control, force control of robotic manipulators, description of force-control tasks, force control strategies, hybrid position/force control, impedance force/torque control.

UNIT – IV

Robot Vision: Industrial applications of vision-controlled robotic systems, process of imaging, architecture of robotic vision system, Image acquisition, description of other components of vision system, image representation, image processing.

UNIT – V

Robot Cell Design and Programming: Robot cell layouts-Robot centered cell, In-line robot cell, Considerations in work cell design, Work cell control, Inter locks, Error detection, Work cell controller.

Methods of robot programming, WAIT, SIGNAL, and DELAY commands, Robotic languages, VAL system.

TEXT BOOKS

1. Industrial Robotics – Mikell P. Groover and Mitchell Weiss, Roger N. Nagel,Nicholas G.Odrey – Mc Graw Hill, 1986.
2. Robotics and control – R K Mittal and I J Nagrath, - Tata Mc Graw Hill

REFERENCES

1. Introduction to Robotics – Analysis, System, Applications by Saeed B. Niku, PHI Publications
2. Robot Analysis and Control - H. Asada and J.J.E. Slotine John Willey & Sons.
3. Fundamentals of Robotics: Analysis and control, Robert J. Schilling, Prentice Hall, 1990.
4. A robot Engineering text book – Mohsen shahinpoor, Harper & Row Publishers,1987
5. Introduction to Robotics: Mechanics and Control, John.J.Craig, Addison- Wesley, 1999
6. Robotics: Control, sensing, vision, and intelligence – K.S. FU, R.C. Gonzalez and C.S.G Lee. Mc Graw Hill, 1987.
7. Robotic Engineering an integrated approach- Richard D. Klafter Thomas – PHI publications

Course outcomes

By studying this course, students will be

- Familiar with the history, concept development and key components of robotics technologies.
- Understand basic mathematic manipulation of spatial coordinate representation and transformation.
- Understand and able to solve basic robot forward and inverse kinematic problems.
- Understand and able to solve robotic dynamics, path planning and control problems.
- Able to undertake practical robotics experiments that demonstrate the above skills.

III B.Tech II Semester

MECHANICAL MANUFACTURING PROCESSES
(Choice Based Credit Course Inter Department)

L	T	P	C
3	1	0	3

Objectives:

The objectives of this course are to introduce to demonstrate the various manufacturing processes. To develop knowledge and importance of surface treatment, processing of powder metals, glass, ceramics plastics. To apply knowledge of basic mathematics to calculate the machining parameters for different machining processes and acquire knowledge on advanced manufacturing processes.

Unit – I

Surface treatment: Scope, Cleaners, Methods of cleaning, Surface coating types, and ceramic and organic methods of coating, economics of coating. Electro forming, Chemical vapour deposition, thermal spraying, Ion implantation, diffusion coating, Diamond coating and cladding.

Unit – II

Processing of Powder metals, Glass and Superconductors: Introduction, production of metal powders, compaction of metal powders, sintering, secondary and finishing operations, design considerations for powder metallurgy, Process capabilities, economics of powder metallurgy, forming and shaping of Glass, techniques for strengthening and treating Glass, design considerations for Glass, processing of superconductors.

Processing of ceramics: Applications, characteristics, classification .Processing of particulate ceramics, Powder preparations, consolidation, Drying , sintering, Hot compaction, Area of application , finishing of ceramics.

Unit – III

Fabrication of Microelectronic devices: Crystal growth and wafer preparation, Film Deposition oxidation, lithography, bonding and packaging, reliability and yield, Printed Circuit boards, computer aided design in microelectronics, surface mount technology, Integrated circuit economics. E-Manufacturing, nanotechnology, and micromachining, High speed Machining

Unit – IV

Processing Of Plastics, injection and blow moulding, calendaring, thermo forming, compression moulding, transfer moulding, High energy rate forming methods Rapid manufacturing: - Introduction - concepts of rapid manufacturing, information flow for rapid prototyping, classification of rapid prototyping process, sterer holography fused deposition modeling, selective laser sintering, Applications of rapid prototyping process

Unit – V

Processing of Composites: Composite Layers, Particulate and fiber reinforced composites, Elastomers, Reinforced plastics, MMC, CMC, Polymer matrix composites.

TEXT BOOKS:

1. Manufacturing Engineering and Technology, Schmid and kalpakjin, Pearson Education.
2. Manufacturing Technology, Foundry forming and welding, Vol I , P.N. Rao,TMH
3. Rapid Prototyping Principles and Applications, RafiqNoorani, Wiely Pub

REFERENCE BOOKS:

1. Production Technology, R.K. Jain, Khanna Publishers,17th edition, 2012
2. Process and materials of manufacturing -Lindberg, PE
3. Principles of Metal Castings, Rosenthal.
4. Welding Process, Parmar, Khanna publication.
5. Manufacturing Technology, R.K. Rajput, Laxmi Pub

Course Outcomes:

After completion of this course student will be able to

- Understand the principles of processing of various powder metals, glass, ceramics and semiconductors.
- Understand the applications of rapid prototyping and processing of plastics

SUGGESTED LINKS:

- www.casde.iitb.ac.in/store/events/2003/IAT-Pune.../DFMA.ppt
- www.rose-hulman.edu/~stienstr/ME470/DFA.ppt
- www.design4manufacturability.com/DFM_article.htm
- http://www.learnerstv.com/Free-Engineering-Video-lectures-ltv234-Page1.htm

III B.Tech II Semester

NON-CONVENTIONAL SOURCES OF ENERGY
(Choice Based Credit Course Inter Department)

L	T	P	C
3	1	0	3

Course Objective:

- To explain concept of various forms of renewable energy
- To outline division aspects and utilization of renewable energy sources for both domestics and industrial applications
- To analyse the environmental and cost economics of using renewable energy sources compared to fossil fuels.

UNIT - I

Principles Of Solar Radiation: Role and potential of new and renewable source, the solar energy option, Environmental impact of solar power, physics of the sun, the solar constant, extraterrestrial and terrestrial solar radiation, solar radiation on titled surface, instruments for measuring solar radiation and sun shine, solar radiation data.

UNIT-II

Solar Energy Collection: Flat plate and concentrating collectors, classification of concentrating collectors, orientation and thermal analysis, advanced collectors.

Solar Energy Storage and Applications :

Different methods, Sensible, latent heat and stratified storage, solar ponds. Solar Applications solar heating technique, solar distillation and drying, photovoltaic energy conversion.

UNIT-III

Wind Energy : Sources and potentials, horizontal and vertical axis windmills, performance characteristics, Betz criteria

BIO-MASS : Principles of Bio-Conversion, Anaerobic/aerobic digestion, types of Bio-gas digesters, gas yield, combustion characteristics of bio-gas, utilization for cooking, I.C.Engineoperation and economic aspects.

UNIT-IV

Geothermal Energy : Resources, types of wells, methods of harnessing the energy, potential in India.

Ocean Energy: OTEC, Principles utilization, setting of OTEC plants, thermodynamic cycles. Tidal and wave energy: Potential and conversion techniques, mini-hydel power plants, and their economics.

UNIT-V

Direct Energy Conversion: Need for DEC, Carnot cycle, limitations, principles of DEC.

Thermo-electric generators, Seebeck, Peltier and Joule Thomson effects, Figure of merit, materials, applications, MHD generators, principles, dissociation and ionization, hall effect, magnetic flux, MHD accelerator, MHD Engine, power generation systems, electron gas dynamic conversion, economic aspects.Fuel cells, principles, faraday's law's, thermodynamic aspects, selection of fuels and operating conditions.

TEXT BOOKS

1. Renewable energy resources, Tiwari and Ghosal, Narosa.
2. Non-Conventional Energy Sources ,G.D. Rai

REFERENCES

1. Renewable Energy Sources, Twidell& Weir
2. Solar Energy, Sukhatme
3. Solar Power Engineering,B.S.Magal Frank Kreith&J.F.Kreith.
4. Principles of Solar Energy, Frank Krieth& John F Kreider.
5. Non-Conventional Energy, Ashok V Desai, Wiley Eastern 6. Non-Conventional Energy Systems, K Mittal , Wheeler.

Course Outcome:

At the end of the course the student will

1. Have knowledge about various renewable energy sources
2. Be able to choose the appropriate renewable energy as an alternate for conventional power in any application.

III B.Tech II Semester

FUNDEMENTALS OF COMMUNICATION SYSTEMS
(Choice Based Credit Course Inter Department)
(QUALITATIVE TREATMENT ONLY)

L	T	P	C
3	1	0	3

Course Objectives:
1. To study the fundamental concept of the analog communication systems.
2. To analyze various analog modulation and demodulation techniques.
3. To know the working of various transmitters and receivers.
4. To understand the influence of noise on the performance of analog communication systems, and to acquire the knowledge about information and capacity.

Learning Outcomes:
This course provides the foundational education in Analog Communication systems, and applications. The students are provided the learning experience through class room teaching and solving assignment & tutorial problems. At the end of course, students should be able to:
a. Acquire knowledge on the basic concepts of Analog Communication Systems.
b. Analyze the analog modulated and demodulated systems.
c. Verify the effect of noise on the performance of communication systems.
d. Know the fundamental concepts of information and capacity.

UNIT- I
Elements of communication systems, need for Modulation, Modulation Methods, Baseband and carrier communication, Amplitude Modulation (AM), Generation of AM signals, Rectifier detector, Envelope detector, sideband and carrier power of AM, Double sideband suppressed carrier (DSB-SC) modulation & its demodulation, Switching modulators, Ring modulator, Balanced modulator, Single sideband (SSB) transmission, VSB Modulation.

UNIT- II
Angle Modulation &Demodulation: Concept of instantaneous frequency, Generalized concept of angle modulation, Bandwidth of angle modulated waves – Narrow band frequency modulation (NBFM); and Wide band FM (WBFM), Phase modulation, Pre-emphasis, & De-emphasis, Illustrative Problems.

UNIT -III
Pulse Analog Modulation Techniques
Pulse analog modulation techniques, Generation and detection of Pulse amplitude modulation, Pulse width modulation, Pulse position modulation.
Multiple Access Techniques
Introduction to multiple access techniques, FDMA, TDMA, CDMA, SDMA: Advantages and applications.

UNIT IV
Digital Communication (Qualitative Approach only)
Pulse Code Modulation, DPCM, Delta modulation, Adaptive delta modulation, Overview of ASK, PSK, QPSK, BPSK and M- PSK techniques

UNIT -V

Modern Communication Trends (Qualitative Approach only)

Basics of Spectrum utilizations, Comparison of 2G, 3G, Types of Ethernet, Modems – Types of Modems, 100Mbps, 1Gbps modems, Role of IPV6 in Present trends.

TEXT BOOKS:

1. B. P. Lathi, "Modern Digital and Analog Communication Systems," Oxford Univ. press, 3rd Edition, 2006.
2. Sham Shanmugam, "Digital and Analog Communication Systems", Wiley-India edition, 2006.
3. Electronic Communications System: Fundamentals Through Advancedby 2nd editions By Wayne Tomasi
4. Simon Hakin, "Communication Systems," Wiley India Edition, 4th Edition, 2011.

REFERENCES:

1. A. Bruce Carlson, & Paul B. Crilly, "Communication Systems – An Introduction to Signals & Noise in Electrical Communication", McGraw-Hill International Edition, 5th Edition, 2010.
2. Simon Haykin, "Communication Systems", Wiley-India edition, 3rd edition, 2010.
3. Herbert Taub & Donald L Schilling, "Principles of Communication Systems", Tata McGraw-Hill, 3rd Edition, 2009.

III B.Tech II Semester

FUZZY LOGIC & NEURAL NETWORKS
(Choice Based Credit Course Inter Department)

L	T	P	C
3	1	0	3

UNIT-I

Neural Networks Characteristics: History of Development in neural networks, Artificial neural net terminology, model of a neuron, Topology, Types of learning. Supervised, Unsupervised learning. Basic Learning laws, Hebb's rule, Delta rule, widrow and Hoff LMS learning rule, correlation learning rule instar and ouster learning rules.

UNIT-II

Unsupervised Learning: Competitive learning, K-means clustering algorithm, Kohonen's feature maps. Radial Basis function neural networks- recurrent networks, Real time recurrent and learning algorithm. Introduction to Counter propagation Networks- CMAC Network, ART networks, Application of NN in pattern recognition, optimization, Control, Speech and decision making.

UNIT-III

Neural Network models: neural network models, layers in neural network and their connections. Instar, outstar, weights on connections, threshold function, application- Adaline and madaline. Back propagation: feed forward back propagation network- mapping, layout, training, BPN applications

UNIT-IV

Fuzzy Logic: Basic concepts of Fuzzy logic, Fuzzy vs Crisp set, Linguistic variables, membership functions, operations of Fuzzy sets, Fuzzy if-then rules, Variables inference techniques, defuzzification techniques, basic Fuzzy interference algorithm, application of fuzzy logic , Fuzzy system design implementation , useful tools supporting design.

UNIT-V

Bidirectional Associative Memory (BAM), inputs and outputs, weights and training. FAM-fuzzy associative memory, association, FAM neural networks, encoding Adaptive Resource theory-network for ART, processing in ART

Text Books:

1. Berkin Riza C and Trubatch, " Fuzzy System design principles- Building Fuzzy IF-THEN rule bases", IEEE Press.
2. Yegna Narayanan, "Artificial Neural Networks". 8th Printing. PHI(2003)
3. Patterson Dan W, "Introduction to artificial Intelligence and Expert systems", 3rd Ed., PHI
4. Simon Haykin, "Neural Networks" Pearson Education.
5. Yen and Langari, "Fuzzy Logic: Intelligence, Control and Information", Pearson Education.
6. Jacek M Zaurada, "Introduction to artificial neural Networks Jaico Publishing Home, Fourth Impression.

III B.Tech II Semester

INDUSTRIAL ELECTRONICS
(Choice Based Credit Course Inter Department)

L	T	P	C
3	1	0	3

Course Objective:

1. To get an overview of semi-conductor devices (such as PN junction diode & Transistor) and their switching characteristics.
2. To study the characteristics of AC to DC converters.
3. To know about the practical applications Electronics in industries.

Learning Outcome:

After completion of the course the students will be able to

a. Get an overview of semi-conductor devices (such as PN junction diode & Transistor) and their switching characteristics.
b. Understand the characteristics of AC to DC converters.
c. Understand about the practical applications Electronics in industries.

UNIT – I :

Semiconductor Devices: Scope of industrial Electronics, Semiconductors, Merits of semiconductors, crystalline structure, Intrinsic semiconductors, Extrinsic semiconductors, current flow in semiconductor, Open-circuited p-n junction, Diode resistance, Zener diode, Photoconductors and junction photo diodes, Photo voltaic effect, Light emitting diodes (LED)

UNIT – II:

Junction Transistors: Introduction, The junction transistor, Conventions for polarities of voltages and currents, Open circuited transistor, Transistor biased in the active region, Current components in transistors, Currents in a transistor, Emitter efficiency, Transport factor and transistor-α, Dynamic emitter resistance, Transistor as an amplifier, Transistor construction, Letter symbols for semiconductor Devices, Characteristic curves of junction transistor in common configuration, static characteristic curves of PNP junction transistor in common emitter configuration, The transistor in common collector Configuration.

UNIT – III :

AC To DC Convertors: AC to DC converters- Introduction, Classification of Rectifiers, Half wave Rectifiers, Full wave Rectifiers, Comparison of Half wave and full wave rectifiers, Bridge Rectifiers, Bridge Rectifier meter, Voltage multiplying Rectifier circuits, Capacitor filter, LC Filter, Metal Rectifiers, Regulated Power Supplies, Classification of Voltage Regulators, Short period Accuracy of Regulators, Long period Accuracy of Voltage Regulator, Principle of automatic voltage Regulator, Simple D.C. Voltage stabilizer using Zener diode, D.C. Voltage Regulators, Series Voltage Regulators, Complete series voltage regulator circuit, Simple series voltage regulator.

UNIT – IV: Industrial Applications – I

Resistance welding controls: Introduction, Resistance welding process, Basic Circuit for A.C. resistance welding, Types of Resistance welding, Electronic welding control used in Resistance welding, Energy storage welding.

Induction heating: Principle of induction heating, Theory of Induction heating merits of induction heating, Application of induction heating, High frequency power source of induction heating

Dielectric heating: Principle of dielectric heating, theory of dielectric heating, dielectric properties of typical materials, electrodes used in dielectric heating, method of coupling of electrodes to the R.F. generator, Thermal losses in Dielectric heating, Applications.

UNIT – V: Industrial Applications - II

Ultrasonics: Introduction, Generation of Ultrasonic waves, Application of Ultrasonic waves, Ultrasonic stroboscope, ultrasonic as means of communication, ultrasonic flaw detection, Optical image on non-homogeneities, ultrasonic study of structure of matter, Dispersive study of structure of matter, Dispersive and colloidal effect of Ultrasonic, Coagulating action of Ultrasonic, separation of mixtures by ultrasoni8c waves, cutting and machining of hard materials by ultrasonic vibrations, Degassing of liquids by ultrasonic waves, Physico-chemical effects of ultrasonics, chemical effects of ultrasonics, Thermal effects of Ultrasonics, soldering and welding by ultrasonics, Ultrasonic Drying

TEXT BOOKS:

1. G. K. Mithal, “Industrial Electronics”, Khanna Publishers, Delhi, 2000.
2. J.Gnanavadivel, R.Dhanasekaran, P.Maruthupandi, “Industrial Electronics”, Anuradha Publications, 2011.

REFERENCE BOOKS:

1. F. D. Petruzulla, “Industrial Electronics”, McGraw Hill, Singapore, 1996.
2. M. H. Rashid, “power Electronics Circuits, Devices and Application”, PHI, 3rd edition, 2004.
3. G. M. Chute and R. D. Chute, “Electronics in Industry”, McGraw Hill Ltd, Tokyo, 1995.

III B.Tech II Semester

OPERATING SYSTEMS
(Choice Based Credit Course Inter Department)

L	T	P	C
3	1	0	3

Course Objective

- To make the students understand the basic operating system concepts such as processes, threads, scheduling, synchronization, deadlocks, memory management, file and I/O subsystems and protection.
- To get acquaintance with the class of abstractions afford by general purpose operating systems that aid the development of user applications

Course Outcomes

- Understand what makes a computer system function and the primary PC components.
- Understand past and current trends in computer technology.
- Use basic software applications.
- Add functionality to the exiting operating systems
- Design new operating systems

UNIT I

Operating Systems Overview: Operating system functions, Operating system structure, operating systems Operations, protection and security, Kernel data Structures, Computing Environments, Open- Source Operating Systems

Operating System Structure: Operating System Services, User and Operating-System Interface, systems calls, Types of System Calls, system programs, operating system structure, operating system debugging, System Boot.

Processes: Process concept, process Scheduling, Operations on processes, Inter process Communication, Examples of IPC systems.

UNIT II

Threads: overview, Multicore Programming, Multithreading Models, Thread Libraries, Implicit threading, Threading Issues.

Process Synchronization: The critical-section problem, Peterson‘s Solution, Synchronization Hardware, Mutex Locks, Semaphores, Classic problems of synchronization, Monitors, Synchronization examples, Alternative approaches.

CPU Scheduling: Scheduling-Criteria, Scheduling Algorithms, Thread Scheduling, Multiple-Processor Scheduling, Real-Time CPU Scheduling, Algorithm Evaluation.

UNIT III

Memory Management: Swapping, contiguous memory allocation, segmentation, paging, structure of the page table.

Virtual memory: demand paging, page-replacement, Allocation of frames, Thrashing, Memory-Mapped Files, Allocating Kernel Memory

Deadlocks: System Model, deadlock characterization, Methods of handling Deadlocks, Deadlock prevention, Detection and Avoidance, Recovery from deadlock.

UNIT IV

Mass-storage structure: Overview of Mass-storage structure, Disk structure, Disk attachment, Disk scheduling, Swap-space management, RAID structure, Stable-storage implementation.

File system Interface: The concept of a file, Access Methods, Directory and Disk structure, File system mounting, File sharing, Protection.

File system Implementation: File-system structure, File-system Implementation, Directory Implementation, Allocation Methods, Free-Space management.

UNIT V

I/O systems: I/O Hardware, Application I/O interface, Kernel I/O subsystem, Transforming I/O requests to Hardware operations.

Protection: Goals of Protection, Principles of Protection, Domain of protection, Access Matrix, Implementation of Access Matrix, Access control, Revocation of Access Rights, Capability-Based systems, Language – Based Protection

Security: The Security problem, Program threats, System and Network threats, Cryptography as a security tool, User authentication, Implementing security defenses, Firewalling to protect systems and networks, Computer–security classifications.

TEXT BOOKS:

1. Operating System Concepts, Abraham Silberschatz, Peter B. Galvin, Greg Gagne, Ninth Edition, 2012, Wiley.
2. Operating Systems: Internals and Design Principles, Stallings, Sixth Edition, 2009, Pearson Education.

REFERENCE BOOKS:

1. Modern Operating Systems, Andrew S Tanenbaum, Second Edition, PHI.
2. Operating Systems, S.Haldar, A.A.Aravind, Pearson Education.
3. Principles of Operating Systems, B.L.Stuart, Cengage learning, India Edition.
4. Operating Systems, A.S.Godbole, Second Edition, TMH.
5. An Introduction to Operating Systems, P.C.P. Bhatt, PHI.
6. Operating Systems, G.Nutt, N.Chaki and S.Neogy, Third Edition, Pearson Education.
7. Operating Systems, R.Elmasri, A,G.Carrick and D.Levine, Mc Graw Hill.

III B.Tech II Semester

DATABASE MANAGEMENT SYSTEMS
(Choice Based Credit Course Inter Department)

L	T	P	C
3	1	0	3

Course Objective:

- To create database and query it using SQL queries, design forms and generate reports.
- Learn to use integrity constraints, referential integrity constraints, triggers, assertions

Course Outcomes

- Design databases
- Retrieve information from data bases
- Use procedures to program the data access and manipulation
- Create user interfaces and generate reports

UNIT I

The Worlds of Database Systems -The Evolution of Database Systems - Overview of a Database Management System - Outline of Database System Studies.

The Entity-Relationship Model – Elements of E/R Model – Design Principles – The Modeling of Constraints – Weak Entity Sets.

The Relational Data Model – Basics of the Relational Model – From E/R Diagrams to Relational Designs – Converting Subclass Structures to Relations.

UNIT II

Relational Algebra and Calculus – Preliminaries, Relational algebra: Selection and Projection , Set Operations, Renaming, Joins, Division - Relational Calculus – Expressive power of Algebra and Calculus.

The Database Language SQL – Simple Queries in SQL – Queries Involving More than One Relation – Subqueries – Full Relation Operations – Database Modifications – Defining a Relation Schema in SQL – View Definitions

UNIT III

Constraints and Triggers – Keys and Foreign keys – Constraints on Attributes and Tuples, Schemalevel

Constraints and Triggers.

Functional Dependencies– Rules about Functional Dependencies -- Design of Relational Database Schemas, Normal Forms based on FDs – Multivalued Dependencies, 4NF, 5NF

UNIT IV

Transaction Management : Transactions, ACID properties, Serializability, Other isolation levels.

Concurrency Control – Serial and Serializable Schedules – Conflict Serializability – Enforcing Serializability by Locks – Locking Systems with Several Lock Modes - Concurrency Control by Timestamps – Concurrency Control by Validation.

UNIT V

Index Structures – Indexes on Sequential Files – Secondary Indexes – B-Trees, B+ Trees – Hashing.

Introduction to Query Optimization.

Failures and Recovery: System Failures – Issues and Models for Resilient Operation – Undo Logging – Redo Logging – Undo/Redo Logging – Protecting Against Media Failures.

TEXT BOOKS:

1. **“Database Systems, The Complete Book”,** Hector Garcia-Molina, Jeffrey D. Ullman and Jennifer Widom, 6th impression, 2011, Pearson.
2. **“Data base Management Systems”,** Raghu Rama Krishnan, Johannes Gehrke, 3rd Edition, 2003, McGraw Hill.

REFERENCE BOOKS:

1. “Fundamentals of Database Systems”, Elmasri Navrate, 6th edition, 2013, Pearson.
2. “Data base Systems design”, Implementation, and Management, Peter Rob & Carlos Coronel 7th Edition.
3. “Introduction to Database Systems”, C.J.Date, Pearson Education.
4. “Data base System Concepts”, Silberschatz, Korth, McGraw Hill, V edition.

(refer Raghu Rama Krishnan text book latest version and frame new syllabus)

III B.Tech II Semester

JAVA PROGRAMMING
(Choice Based Credit Course Inter Department)

L	T	P	C
3	1	0	3

Course Objectives:
- Study the syntax, semantics and features of Java Programming Language
- Study the Object Oriented Programming Concepts of Java Programming language
- Learn the method of creating Multi-threaded programs and handle exceptions
- Learn Java features to create GUI applications & perform event handling

Course Outcomes:
- Solve problems using object oriented approach and implement them
- Ability to write Efficient programs that handle exceptions
- Create user friendly interface

UNIT I

The History and Evolution of Java: Java's Lineage, The Creation of Java, How Java Changed the Internet, Java's Magic: The Bytecode, Servlets: Java on the Server Side, The Java Buzzwords, The Evolution of Java, Java SE 8, A Culture of Innovation.

An Overview of Java: Object-Oriented Programming, A First Simple Program, A Second Short Program, Two Control Statements, Using Blocks of Code, Lexical Issues, The Java Class Libraries.

UNIT II

Data Types, Variables, and Arrays: Java Is a Strongly Typed Language, The Primitive Types, Integers, Floating-Point Types, Characters, Booleans, A Closer Look at Literals, Variables, Type Conversion and Casting, Automatic Type Promotion in Expressions, Arrays, A Few Words About Strings, A Note to C/C++ Programmers About Pointers.

Operators: Arithmetic Operators, The Bitwise Operators, Relational Operators, Boolean Logical Operators, The Assignment Operator, The ? Operator, Operator Precedence, Using Parentheses.

Control Statements: Java's Selection Statements, Iteration Statements, Jump Statements.

UNIT III

Introducing Classes: Class Fundamentals,Declaring Objects, Assigning Object Reference Variables ,Introducing Methods,Constructors,The this Keyword, The finalize( ) Method, A Stack Class.

A Closer Look at Methods and Classes: Overloading Methods, Using Objects as Parameters, A Closer Look at Argument Passing, Returning Objects, Recursion, Introducing Access Control, Understanding static, Introducing final, Arrays Revisited, Introducing Nested and Inner Classes, Exploring the String Class, Using Command-Line Arguments, Varargs: Variable-Length Arguments.

UNIT IV

Inheritance: Inheritance Basics, Using super, Creating a Multilevel Hierarchy, When Constructors Are Executed, Method Overriding, Dynamic Method Dispatch,Using Abstract Classes, Using final with Inheritance, The Object Class.

Packages and interfaces: Packages, Access Protection, Importing Packages, Interfaces,Default Interface Methods,Use static Methods in an Interface, Final Thoughts on Packages and Interfaces.

Exception Handling: Exception-Handling Fundamentals, Exception Types, Uncaught Exceptions, Using try and catch,Multiple catch Clauses, Nested try Statements, throw, throws, finally, Java's Built-in Exceptions,

Creating Your Own Exception Subclasses, Chained Exceptions, Three Recently Added Exception Features, Using Exceptions.

UNIT V

Multithreaded Programming: The Java Thread Model, The Main Thread, Creating a Thread, Creating Multiple Threads, Using isAlive( ) and join( ), Thread Priorities, Synchronization, Interthread Communication, Suspending, Resuming, and Stopping Threads. Obtaining A Thread's State, Using Multithreading.

Enumerations, Autoboxing, and Annotations (Metadata): Enumerations, Type Wrappers, Autoboxing, Annotations (Metadata), Type Annotations, Repeating Annotations.

Text Book:

JAVA the Complete Reference 9th edition, Herbe

III B.Tech II Semester

IMMUNOLOGY
(Choice Based Credit Course Inter Department)

L	T	P	C
3	1	0	3

Course Objective:
This course aims to familiarize the students to mechanisms associated with immune system, any abnormalities which could lead to disease development.

Course Outcome:
Students will be able to distinguish between innate & acquired immunity, they should also be able to demonstrate and identify immune cells specific functions. They can correlate between immune/disease developments.

UNIT I: Basics of immunology
Immunity: Types of immunity, Innate & Adaptive; Cells of immune system, Organs of the immune system, Primary lymphoid organs (bone marrow, Thymus), Secondary lymphoid organs (Spleen, Lymphnode, MALT, CALT), Immunogen, Antigen and their chemical nature, Factors that influence immunogenicity, epitopes, properties of “B” cell epitopes & “T” cell epitopes, haptens & adjuvants.

UNIT II: Immunoglobulin’s: structure & function
Basic & fine structure of Immunoglobulin classes & their functions, isotopes, allotypes & idiotypes, Monoclonal antibodies: production of Monoclonal antibodies and their uses.

UNIT III: Complement system & its path ways, antigen- antibody interactions & immune assays.

UNIT IV: Humoral immunity & cell mediated immunity
MHC, Antigen processing and, Antigen presentation cells, structure & functions of TCR, T-cell maturation, activation & differentiation of T cell. T cell subclasses & linkage. Activation of B cells, proliferation by thymus dependent & thymus independent antigens. B cell differentiation, class switching & generation of plasma & memory cells. Primary immune response & secondary immune responses.

UNIT V: Hyper sensitivity & Auto immune disease & tumor immunology
Hypersensitivity & its types, autoimmunity, autoimmune disorders, transplantation, tumor Transplantation, mechanism of graft rejection, immuno suppressive drugs.

TEXT BOOKS:

1. E. Roitt Essential Immunology, Vaccines conventional, subunit and recombinant, antidiotypic vaccine, Blackwell Scientific publications, Oxford,1991.
2. Kuby Immunology, 5th Edition. Richard A Goldsby, Thomas J Kindt Barbara A Osborne. W H Freeman and Company, 2006.

REFERENCES:

1. Benjamin E and Leskowitz S, immunology A short Course. Wiley LISS NY, 1991. ELISA Immunological Techniques. DNA vaccines Immunotechnology.

2. Cellular Molecular Immunology. Abul Abbas and Litchman, 2003.

III B.Tech II Semester

DOWNSTREAM PROCESSING
(Choice Based Credit Course Inter Department)

L	T	P	C
3	1	0	3

Course Objective:
This course aims to introduce the students to different steps of downstream processing including cell disruption, separations, extractions, fractionations & Concentrations.

Course Outcome:
At the end of the course the students will be able to differentiate between different separation techniques and design a combination of downstream techniques for a given process. They will be able to analyze scientific results from real examples and calculate operating parameters for a particular operation.

UNIT I: Role of Downstream Processing In Biotechnology
Role and importance of downstream processing in biotechnological processes. Problems and requirements of bio product purification. Economics of downstream processing in Biotechnology, cost-cutting strategies, characteristics of biological mixtures, process design criteria for various classes of bio products (high volume, low value products and low volume, high Value products)

UNIT II: Primary Separation And Recover Process
Cell disruption methods for intracellular products, removal of insoluble, biomass (and particulate debris) separation techniques, flocculation and sedimentation, centrifugation and filtration methods.

UNIT III: Membrane Separations
Introduction, Principles & theory, Requirements of membranes, Structure of membranes, Membrane types and their preparation, Membrane modules, flow patterns in membrane modules, Membrane fouling, Membrane separation process: Types Principles, driving forces and applications

UNIT IV: Enrichment Operations
Precipitation methods (with salts, organic solvents, and polymers, extractive separations, aqueous two-phase extraction, supercritical extraction), in situ product removal, integrated bioprocessing.

UNIT V: Electrophoresis & Product Resolution / Fractionation
Introduction, Principles and theory, Electrophoresis equipment, Gel electrophoresis, SDS Page, Isoelectric focusing, 2D Gel Electrophoresis, Pulse field Electrophoresis
Chromatographic techniques- Paper, TLC, Adsorption, Ion exchange, Gel filtration, affinity chromatographic separation processes, GC, HPLC, FPLC, Chromatofocusing electrophoretic separations.

TEXT BOOKS:
1. Wankat PC. Rate controlled separations, Elsevier, 1990.
2. Ajay Kumar and Abhisek Awasthi “ Bioseparation Engineering” I.K. International publicationsm, 2007.

REFERENCES:
1. Product Recovery in Bioprocess Technology, BIOTOL.’ Series, VCH, 1990.
2. Asenjo J.M. Separation processes in Biotechnology, 1993, Marcel Dekkere Inc.
3. M.R.Ladisch, Bioseparation engineering: Principles, Practice and Economics, Wiley Interscience, 2001.
4. Belter PA and Cussler E. Bioseparations, Wiley, 1985.

III B.Tech II Semester

TRANSPORT PHENOMENA IN BIOPROCESSES
(Choice Based Credit Course Inter Department)

L	T	P	C
3	1	0	3

Course Objective:

This course will provide the fundamentals to solve real life problems involving transports of momentum, energy and mass in biological, mechanical and chemical systems using a unified approach.

Course Outcomes:

- Understanding of transport processes.
- Ability to do heat, mass and momentum transfer analysis.
- Ability to analyze industrial problems along with appropriate boundary conditions.
- Ability to develop steady and time dependent solutions along with their limitations

UNIT I: Momentum Transport

Mechanism of Momentum Transport: Newton's Law of Viscosity, Non- Newtonian fluids, theory of viscosity of liquids, time dependant viscosity, viscosity measurement (cone-and-plate viscometer, coaxial cylinder rotary viscometer, impeller viscometer), use of viscometers with biological reaction fluids, rheological properties of fermentation broth, factors affecting broth viscosity (cell concentration, cell morphology, osmotic pressure, product and substrate concentration), Velocity distribution in laminar flow and turbulent flow

UNIT II: Shell Momentum balances and Mixing of Fluids

Flow of Falling Film, Flow through circular tube, Flow through the annulus, Flow of two adjacent immiscible fluids

Introduction to turbulent flow, time smoothening, mixing, mixing mechanism, power requirements in ungassed Newtonian and Non Newtonian fluids, gassed fluids, interaction between cell and turbulent Eddies, operating conditions for turbulent shear damage.

UNIT III: Energy Transport

Thermal conductivity and the mechanisms of energy transport- measurement of thermal conductivity, Fourier's law, steady state conduction, analogy between heat and momentum transfer

UNIT IV: Mass Transport & Shell Mass Balances

Theory of Diffusion and estimation of Diffusion coefficient for gases, liquids, in colloidal a polymers suspensions in polymers. shell mass balances: Diffusion through a stagnant gas film, diffusion with in a heterogeneous and homogeneous chemical reaction. Diffusion and chemical reaction inside a porous catalyst.

UNIT V: Oxygen Transport

Oxygen uptake in cell cultures, Factors affecting cellular oxygen demand, oxygen transfer from gas bubbles to aerobic culture, oxygen transfer in fermentors- bubbles, factors affecting oxygen transport- sparging, stirring, medium properties, antifoam agents, temperature, mass transfer correlations, measurements of kLa - oxygen balance method, dynamic method.

Note: In all units relevant basic numerical problems should be practiced

TEXT BOOKS:

1. R.B.Bird, W.E.Stewart, E.N.Lightfoot, Transport Phenomena, John wiley and sons, Singapore , 1994.
2. P.M.Doran, Bioprocess Principles, Academic Press, 1995.
3.Harvey W. Blanch, Douglas S. Clark Biochemical Engineering, Marcecel, Dekker, 2007.

REFERENCES:1. M.L.Shuler and F. Kargi, Bioprocess Engineering: Basic concepts, 2nd edition, Prentice Hall of India, 2003.

III B.Tech II Sem (E.C.E)

MICROPROCESSORS & MICROCONTROLLERS LAB

L	T	P	C
0	0	3	2

Course Objectives:

1. To become skilled in 8086 Assembly Language programming.
2. To understand programmable peripheral devices and their Interfacing.
3. To understand and learn 8051 microcontroller.
4. To learn 8051 assembly Language programming

Learning Outcomes:

a. Able to write8086 Assembly Language programs.
b. Able to understand programmable peripheral devices and their Interfacing.
c. Able to write 8051 assembly Language programs.

Minimum Ten Experiments to be conducted (Five from each section)

I) 8086 Microprocessor Programs using MASM/8086 kit.

1. Introduction to MASM Programming.
2. Arithmetic operation – Multi byte Addition and Subtraction, Multiplication and Division – Signed and unsigned Arithmetic operation, ASCII – arithmetic operation.
3. Logic operations – Shift and rotate – Converting packed BCD to unpacked BCD, BCD to ASCII conversion.
4. By using string operation and Instruction prefix: Move Block, Reverse string, Sorting, Length of the string, String comparison.

Interfacing:

5. 8259 – Interrupt Controller and its interfacing programs
6. 8255 – PPI and its interfacing programs (A /D, D/A, stepper motor,)
7. 7-Segment Display.

II) Microcontroller 8051 Trainer kit

1. Arithmetic operation – Multi byte Addition and Subtraction, Multiplication and Division – Signed and unsigned Arithmetic operation.
2. Logic operations – Shift and rotate.
3. Sorting- Ascending and descending order.

Interfacing using 8051 Trainer kit:

4. Key board Interfacing
5. Seven Segment display
6. Switch Interfacing
7. Relay Interfacing
8. UART

III B.Tech II Sem (E.C.E)

DIGITAL COMMUNICATION SYSTEMS LAB

L	T	P	C
0	0	3	2

Course Objectives:

1. To provide a real time experience for different digital modulation and demodulation schemes

Learning Outcomes: After completion of the course the students will be able

a. To experience real time behavior of different digital modulation schemes and technically visualize spectra of different digital modulation schemes

Minimum of Ten experiments to be conducted (Five from each Part-A&B)

PART-A: HARDWARE EXPERIMENTS

1. Sampling Theorem – verification.
2. Time division multiplexing.
3. Pulse code modulation.
4. Differential pulse code modulation.
5. Delta modulation.
6. Frequency shift keying.
7. Differential phase shift keying.
8. QPSK modulation and demodulation.

PART-B: SOFTWARE EXPERIMENTS
(Modeling of Digital Communications using MATLAB)

1. Sampling Theorem – verification.
2. Pulse code modulation.
3. Differential pulse code modulation.
4. Delta modulation.
5. Frequency shift keying.
6. Phase shift keying.
7. Differential phase shift keying.
8. QPSK modulation and demodulation.

Equipment required for Laboratories:

1. RPS - 0 – 30 V
2. CROs - 0 – 20 M Hz.
3. Function Generators - 0 – 1 M Hz
4. RF Generators (3 Nos.) - 0 – 1000 M Hz.
5. Multimeters
6. Lab Experimental kit for Pulse Code Modulation (Experiment No.3 of part – A)
7. Required Electronic Components (Active and Passive) which include required ICs
8. Arbitrary Wave form generators/ PNS generators – 2 Nos. (to generate digital data at required data rates)
9. Licensed MATLAB software for 30 users with required tool boxes.

III B.Tech II Semester

ADVANCED ENGLISH LANGUAGE COMMUNICATION SKILLS (AELCS) LAB

L	T	P	C
0	0	3	0

Introduction:

The introduction of the Advanced Communication Skills Lab is considered essential at 3rd year level. At this stage, the students need to prepare themselves for their careers which may require them to listen to, read, speak and write in English both for their professional and interpersonal communication in the globalised context.

The proposed course should be a laboratory course to enable students to use 'good' English and perform the following:

- Gathering ideas and information to organize ideas relevantly and coherently.
- Engaging in debates.
- Participating in group discussions.
- Facing interviews.
- Writing project/research reports/technical reports.
- Making oral presentations.
- Writing formal letters.
- Transferring information from non-verbal to verbal texts and vice-versa.
- Taking part in social and professional communication.

Objectives:

This Lab focuses on using multi-media instruction for language development to meet the following targets:

- To improve the students' fluency in English, through a well-developed vocabulary and enable them to listen to English spoken at normal conversational speed by educated English speakers and respond appropriately in different socio-cultural and professional contexts.
- Further, they would be required to communicate their ideas relevantly and coherently in writing.
- To prepare all the students for their placements.

Syllabus:

The following course content to conduct the activities is prescribed for the Advanced Communication Skills (ACS) Lab:

UNIT-I: Communicative Competency

1. Reading Comprehension – Techniques-Book Review
2. Listening comprehension – Video Talks-Eminent speeches
3. Verbal Competency - Vocabulary - Spotting Errors- Aptitude Tests

UNIT-II: Technical Writing

1. Essentials of writing -Technical Paper/ Report writing-Concise writing
2. Administrative / Business Documentation – Circular Writing -Meeting – Agenda – Minutes-Resolutions
3. Project Writing – Framing Outline – Finding Problem- Documentation-Citation

UNIT-III: Presentational Skills

1. Oral presentations – Public Speaking –Paper & Seminar Presentation
2. Digital Presentations -Power point - Video Presentation -Poster presentation
3. Stage Dynamics – Body Language – Para Language

UNIT-IV: Corporate Skills

1. Etiquettes -Dress - Dining – Net Etiquettes
2. Telephonic skills –Mobile Etiquettes
3. Soft Skills – Intra – Inter Personal Skills

UNIT-V: Getting Ready For Job

1. Before Interview -Curriculum vitae/ Resume-Covering letter-E-mail writing
2. During Interview – G.D-Mock Interviews– Psychometric Tests – Follow up
3. After interview - Excelling in Profession– Team spirit– Work culture

Learning Outcomes:

- Acquiring extensive range of vocabulary and its proper use contextually
- Flair in Writing and felicity in written expression.
- Enhanced job prospects / Employability skills /developing organizational abilities in tune with corporate requirement
- Effective Speaking Abilities

Minimum Requirement:

The Advanced Communication Skills (ACS) Laboratory shall have the following infra-structural facilities to accommodate at least 35 students in the lab:

- Spacious room with appropriate acoustics.
- Round Tables with movable chairs
- Audio-visual aids /LCD Projector
- Public Address system
- P – IV Processor, Hard Disk – 80 GB, RAM–512 MB Minimum, Speed – 2.8 GHZ
- T. V, a digital stereo & Camcorder
- Headphones of High quality

Suggested Software:

The software consisting of the prescribed topics elaborated above should be procured and used.

1. **K-VAN SOLUTIONS-Advanced communication lab**
2. **DELTA's key to the Next Generation TOEFL Test: Advanced Skill Practice.**
3. **TOEFL & GRE**(KAPLAN, AARCO & BARRONS, USA, Cracking GRE by CLIFFS)
4. **Train2success.com**

Books Recommended:

1. **Objective English for Competitive Exams**, Hari Mohana Prasad, 4th edition, Tata Mc Graw Hill.
2. **Effective Technical Communication,** Ashrif Rizvi, TataMcGrahill, 2011.
3. **Technical Communication**, Meenakshi Raman & Sangeeta Sharma, O U Press 2009.
4. Books on **TOEFL/GRE/GMAT/CAT/IELTS**, Barron's/DELTA/Cambridge University Press.2012.
5. **Soft Skills for Everyone,** Butterfield Jeff, Cengage Publications, 2011.
6. **Ultimate Psychometric Tests**: Mike Bryon,Vinod Vasishtha for Kogan Page India Pvt. Ltd, New Delhi.
7. **Soft Skills-** Know Yourself And Know The World, Dr.K.Alex, Chand Publications ,Third revised edition 2014.
8. **Management Shapers Series** , Universities Press (India) Pvt Ltd., Himayatnagar, Hyderabad 2008.
9. **Word Power Made Handy,** Shalini Verma, S Chand Publications, 2011.

IV B.Tech – I Sem. (ECE)

MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS

L	T	P	C
3	1	0	3

Prepare engineering students to analyze cost/revenue data and carry out make economic analyses in the decision making process to justifiy or reject alternatives/projects on an economic basis

Unit I

Introduction to Managerial Economics & Demand Analysis: Definition of Managerial Economics, Characteristics and Scope – Managerial Economics and its relation with other subjects- Basic economic tools in Managerial Economics

Demand Analysis: Meaning- Demand distinctions- Demand determinants- Law of Demand and its exceptions.

Elasticity of Demand & Theory of Production and Cost Analysis: Definition -Types of Elasticity of demand - Measurement of price elasticity of demand: Total outlay method, Point method and Arc method- Significance of Elasticity of Demand.

Unit-II

Demand Forecasting: Meaning - Factors governing demand forecasting - Methods of demand forecasting Forecasting demand for new products- Criteria of a good forecasting method

Theory of Production and Cost Analysis: Production Function- Isoquants and Isocosts, MRTS, Cobb-Douglas Production function

Cost Analysis: Cost concepts, Opportunity cost, Fixed Vs Variable costs, Explicit costs Vs. Implicit costs, Out of pocket costs vs. Imputed costs.-Determination of Break-Even Point (simple problems) - Managerial Significance and limitations of BEP.

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Unit-III

Introduction to Markets & Pricing Policies: Market structures**:** Types of competition, Features of Perfect Competition, Monopoly and Monopolistic Competition. Price-Output Determination under Perfect Competition, Monopoly, Monopolistic Competition.

Pricing Policies: Methods of Pricing-Marginal Cost Pricing, Limit Pricing, Market Skimming Pricing, Penetration Pricing, Bundling Pricing, and Peak Load Pricing.Internet Pricing Models: Flat rate pricing, Usage sensitive pricing, Transaction based pricing, Priority pricing, charging on the basis of social cost, Precedence model, Smart market mechanism model.

UNIT-IV

Types of Industrial Organization & Introduction to business cycles: Characteristic features of Industrial organization, Features and evaluation of Sole Proprietorship, Partnership, Joint Stock Company, State/Public Enterprises and their types.

Introduction to business cycles: Meaning-Phases of business cycles- Features of business cycles.

Capital and Capital Budgeting: Meaning of capital budgeting, Need for capital budgeting – Capital budgeting decisions (Examples of capital budgeting) - Methods of Capital Budgeting: Payback Method, Accounting Rate of Return (ARR), IRR and Net Present Value Method (simple problems)

Unit V

Introduction to Financial Accounting: Introduction to Double-entry system, Journal, Ledger, Trial Balance- Final Accounts (with simple adjustments) - Limitations of Financial Statements.

Interpretation and analysis of Financial Statement: Ratio Analysis – Liquidity ratios, Profitability ratios and solvency ratios – Preparation of changes in working capital statement and fund flow statement.

TEXT BOOKS:

1. **J.V. Prabhakar Rao**: Managerial Economics and Financial Analysis, Maruthi Publications, 2011
2. **N. Appa Rao. & P. Vijaya Kumar**: 'Managerial Economics and Financial Analysis', Cengage Publications, New Delhi, 2011

REFERENCES:

1. **A R Aryasri -** Managerial Economics and Financial Analysis, TMH 2011
2. **Suma damodaran**- Managerial Economics, **Oxford** 2011
3. **S.A. Siddiqui & A.S. Siddiqui**, Managerial Economics and Financial Analysis, New Age International Publishers, 2011.

Outcomes

1. Be Able To Perform And Evaluate Present Worth Future Worth And Annual Worth Analyses On One Of More Economic Alternatives.
2. Be Able To Perform And Evaluate Pay Back Period And Capitalized Cost On One Or More Economic Alternatives.
3. Be Able To Carry Out And Evaluate Benefit/Cost,Life Cycle And Break Even Analyses On One Or More Economic Alternatives

IV B.Tech I Sem (E.C.E)

VLSI DESIGN

L	T	P	C
3	1	0	3

Course Objectives:

1. To understand VLSI circuit design processes.
2. To understand basic circuit concepts and designing Arithmetic Building Blocks.
3. To have an overview of Low power VLSI.

Learning Outcomes: Students can able to

a. Design and explain the fabrication of various VLSI circuits.
b. Explain the basic circuit concepts
c. Design various subsystems.
d. Know the programming skills using VHDL and testing.

UNIT-I

Introduction: Brief Introduction to IC technology – MOS, PMOS, NMOS, CMOS & Bi-CMOS technologies–Oxidation, Lithography, Diffusion, Ion implantation, Metallization, Encapsulation.

Basic Electrical Properties of MOS and BiCMOS Circuits: I_{ds}–V_{ds} relationships, MOS transistor threshold Voltage, g_m, g_{ds}, figure of merit ω_0; Pass transistor, NMOS Inverter, Various pull ups, CMOS Inverter analysis and design, Bi-CMOS Inverters.

UNIT-II

Basic Circuit Concepts: Sheet Resistance R_s and its concepts to MOS, Area Capacitance calculations, Inverter Delays, Driving large Capacitive Loads, Wiring Capacitances, Fan-in and fan-out.

VLSI Circuit Design Processes: VLSI Design Flow, MOS Layers, Stick Diagrams, Design Rules and Layout, Case study: 2μm CMOS Design rules for wires, Contacts and Transistors Layout Diagrams for NMOS and CMOS Inverters and Gates, Scaling of MOS circuits, Limitations of Scaling.

UNIT-III

Gate level Design: Logic gates and other complex gates, Switch logic, Alternate gate circuits.

Physical Design: Floor-Planning, Placement, routing, Power delay estimation, Clock and Power routing

UNIT-IV

Subsystem Design: Shifters, Adders, ALUs, Multipliers, Parity generators, Comparators, Counters, High Density Memory Elements.

VLSI Design styles: Full-custom, Standard Cells, Gate-arrays, ASIC, FPGAs, CPLDs and Design Approach for Full-custom and Semi-custom devices.

UNIT-V

VHDL Synthesis: VHDL Synthesis, Circuit Design Flow, Circuit Synthesis, Simulation, Layout, Design capture tools, Design Verification Tools.

Any two Case Studies.

TEXT BOOKS:

1. Kamran Eshraghian, Eshraghian Douglas and A. Pucknell, “Essentials of VLSI circuits and systems”, PHI, 2013 Edition.
2. K.Lal Kishore and V.S.V. Prabhakar, “VLSI Design”, IK Publishers

REFERENCES:

1. Weste and Eshraghian, “Principles of CMOS VLSI Design”, Pearson Education, 1999.
2. Wayne Wolf, “Modern VLSI Design”, Pearson Education, 3rd Edition, 1997.
3. John P. Uyemura, “Chip Design for Submicron VLSI: CMOS layout and Simulation”, Thomson Learning.
4. John P. Uyemura, “Introduction to VLSI Circuits and Systems”, John wiley, 2003.
5. John M. Rabaey, “Digital Integrated Circuits”, PHI, EEE, 1997.

IV B.Tech I Sem (E.C.E)

OPTICAL FIBRE COMMUNICATION

L	T	P	C
3	1	0	3

Course Objectives:

1. To learn the basic concepts of fibre optics communications.
2. To make the students learn the system with various components or process for various applications.
3. To enlighten the student with latest trends in optical communications.

Learning Outcomes: The students can able

a. To demonstrate the ability to design a system, component or process as per needs and specification.
b. To learn about SONET/SDH and its application.

UNIT-I

Introduction to Optical Fibers: Evolution of fiber optic system- Element of an Optical Fiber Transmission link- Ray Optics-Optical Fiber Modes and Configurations –Mode theory of Circular Wave guides- Overview of Modes-Key Modal concepts- Linearly Polarized Modes –Single Mode Fibers-Graded Index fiber structure.

UNIT-II

Signal Degradation Optical Fibers: Attenuation – Absorption losses, Scattering losses, Bending Losses, Core and Cladding losses, Signal Distortion in Optical Wave guides -Information Capacity determination –Group Delay- Material Dispersion, Wave guide Dispersion, Signal distortion in SM fibers-Polarization Mode dispersion, Intermodal dispersion, Pulse Broadening in GI fibers-Mode Coupling –Design Optimization of SM fibers-RI profile and cut-off wavelength.

UNIT-III

Fiber Optical Sources and Coupling : Direct and indirect Band gap materials-LED structures –Light source materials –Quantum efficiency and LED power, Modulation of a LED, lasers Diodes-Modes and Threshold condition –Rate equations –External Quantum efficiency –Resonant frequencies –Temperature effects, Introduction to Quantum laser, source-to-fiber Power Launching, Lensing schemes, Fibre –to- Fibre joints, Fibre splicing.

UNIT-IV

Fiber Optical Receivers : PIN and APD diodes –Photo detector noise, SNR, Detector Response time, Avalanche Multiplication Noise –Comparison of Photo detectors –Fundamental Receiver Operation – preamplifiers, Error Sources –Receiver Configuration –Probability of Error –Quantum Limit.

UNIT-V

System Designand Applications: Design of Analog Systems: system specification, power budget, bandwidth budget

Design of Digital Systems: system specification, rise time budget, power budget, Receiver sensitivity, Overview of WDM.

Applications: Telephony, Telemetry, video distribution, military applications, passive and active sensing.

TEXT BOOKS:

1. Gerd Keiser, “Optical Fiber Communication” McGraw –Hill International, Singapore, 3rd ed., 2000.
2. J.Senior, “Optical Communication, Principles and Practice”, Prentice Hall of India, 1994.

REFERENCES:

1. Max Ming-Kang Liu, “Principles and Applications of Optical Communications”, TMH, 2010.
2. S.C.Gupta, “Text book on optical fiber communication and its applications”, PHI, 2005.
3. Satish Kumar, “Fundamentals of Optical Fiber communications”, PHI, 2009.

IV B.Tech I Sem (E.C.E)

EMBEDDED SYSTEMS

L	T	P	C
3	1	0	3

Course Objectives:

1. To understand the fundamental concepts of Embedded systems.
2. To learn the kernel of RTOS, architecture of ARM processor.
3. To know various embedded Tools.

Learning Outcomes:

a. Learns the fundamental concepts of Embedded systems.
b. Learns the kernel of RTOS, architecture of ARM processor
c. Becomes aware of various embedded Tools.

UNIT-I

Introduction to Embedded Systems: Embedded Systems, Processor embedded into a system, Embedded hardware units and devices in a system, Embedded software in a system, Examples of embedded systems, Embedded system-on-chip (Soc), Design process in embedded systems, Formalization of embedded systems, Classification of embedded systems, Skills required for an embedded system designer.

UNIT-II

Advanced Microcontrollers I:

Introduction to ARM architecture and Cortex – M series, Intoduction to TIVA family viz. TM4C123x & TM4C 129X and its targeted application, Tiva block diagram, address space on-chip peripherals (analog and digital) Register sets, Addressing modes and instruction set basics

UNIT-III

Advanced Microcontrollers II:

Introduction to the MSP 430 family viz. 430x2x, MSP430x4x and its targeted applications, study of sample embedded system on 16-bit MSP430 microcontroller. MSP430 block diagram, address space, on-chip peripherals (analog and Digital) Register sets, Addressing modes and instruction set basics, SHARC processor- Architecture, features

UNIT-IV

Communication Protocols and Interfacing Devices:

Synchronous/ Asynchronous interfaces (like UART, SPI, I2C, USB), serial communication basics, baud rate concepts, Interfacing digital and analog external device, I2C protocol, SPI protocol & UART protocol.

UNIT-V

Embedded Networking and Internet of Things:

IoT overview and architecture, Overview of wireless sensor networks and design examples, various wireless protocols and its applications: NFC, Zigbee, Bluetooth, Bluetooth Low Energy, Wi-Fi, Adding Wi-Fi capability to microcontrollers, Embedded Wi-Fi, User APIs for wireless and networking application, Building IoT applications using CC3100 user API: connecting sensor devices.

TEXT BOOKS:

1. John Davies, “MSP430 Microcontroller Basics”, Newnes, Ist Edition
2. Raj Kamal, “Embedded Systems”, Tata Mcgraw Hill(TMH) Second Edition.
3. Kenneth J.Ayala Penram, “The 8051 Microcontroller”, International (PI) Second Edition

REFERENCES

1. 1. Frank Vahid, Tony D. Givargis, “Embedded System Design – A Unified Hardware/Software Introduction”, John Wiley, 2002.
2. KVKK Prasad, “Embedded / Real Time Systems” Dreamtech Press, 2005.
3. Jonathan W. Valvano, Brooks / Cole, “Embedded Microcomputer Systems”, Thompson Learning.
4. David E. Simon, “An Embedded Software Primer”, Pearson Ed., 2005.

IV B.Tech I Sem (E.C.E)

DIGITAL IMAGE PROCESSING
(CBCC-I)

L	T	P	C
3	1	0	3

Course Objectives:

1. To learn the fundamentals of Image Processing.
2. To learn sampling and reconstruction procedures.
3. To learn the various transforms used in image Processing.
4. To study various concepts of image enhancement, reconstruction and image compression.
5. To design image processing systems.

Learning Outcomes:

a. Develops ability to identify, formulate &solve problems involving images.
b. Develops ability to design &conduct experiments, analyze &interpret image data.
c. To design a software, Component or process as per needs &specifications.
d. It will demonstrate the skills to use modern engineering tools, software's &equipment to analyze problems.
e. Develop confidence for self-education & ability for life-long learning.
f. It will show the ability to participate & try to succeed in competitive Exams.

UNIT-1:

Digital Image Fundamentals: Elements of digital image processing systems, An image model, Basic relationships between pixels and basic transformation, Image acquisition, sampling and quantization, Image file formats Two dimensional convolution, Two dimensional correlation, Two dimensional frequency responses.

Image Transforms: Study analysis with examples of 2D transforms, Transforms: DFT, DCT, Discrete Sine, Walsh, Hadamard, Slant, Haar, KLT, Radon, Hough, and Wavelet

UNIT-2:

Image Enhancement: Image enhancement through – point processing, Histogram processing, spatial filtering, Enhancement in frequency domain, image smoothing, image sharpening

UNIT-3:

Image Restoration: Noise distributions, Degradation model, Unconstrained and constrained restoration, Inverse filtering, minimum mean square error (Wiener) filtering, Constrained least square restoration

UNIT-4:

Image Segmentation And Recognition: Edge detection, Image segmentation: Region growing, Region splitting and merging, Edge linking, Morphological operations: Dilation, Erosion, Opening, Closing, Image recognition: Patterns and pattern classes, Matching by minimum distance classifier, Statistical classifier, Matching by correlation.

UNIT-5:

Image Compression: Need for image compression, Image coding, Huffman coding, Run length encoding, Arithmetic encoding, Vector Quantization, Block truncation coding, Transform coding: DCT, Wavelet, Image compression standards

TEXT BOOKS:

1. R. C .Gonzalez & R.E. Woods, “Digital Image Processing”, Addison Wesley/Pearson education, 3rd Edition, 2010.
2. A .K. Jain, “Fundamentals of Digital Image processing”, PHI.

REFERENCES:

1. Rafael C. Gonzalez, Richard E woods and Steven L.Eddins, “Digital Image processing using MATLAB”, Tata McGraw Hill, 2010.
2. S Jayaraman, S Esakkirajan, T Veerakumar, “Digital Image processing”, Tata McGraw Hill
3. William K. Pratt, “Digital Image Processing”, John Wilely, 3rd Edition, 2004.

IV B.Tech I Sem (E.C.E)

DSP PROCESSORS & ARCHITECTURES
(CBCC-I)

L	T	P	C
3	1	0	3

Course Objectives:

1. To understand the concept of DSP Architecture & comparison of this with that of microprocessors.
2. To understand addressing modes, instruction sets , pipelining and application programs in TMS320C54XX processor
3. To understand the architectural issues of programmable DSP devices and their relationship to the algorithmic requirements, architectures of commercially popular programmable devices and the use of such devices for software development and system design
4. To highlight the suitability of programmable DSP devices for various application areas and motivate to design systems around these devices.

Learning Outcomes:

a. To become familiar with fundamentals of DSP Processors & architectures.
b. To gain in knowledge about the different types of processors and their operation.
c. Will demonstrate the ability to design a system component or process as per needs & specifications.
d. Will demonstrate the ability to identify, formulate & solve engineering problems.

UNIT-I

Introduction to Digital Signal Processing: Introduction, a Digital signal-processing system, the sampling process, Discrete time sequences. Discrete Fourier Transform (DFT) and Fast Fourier Transform (FFT), linear time-invariant systems, Digital filters, Decimation and interpolation, Analysis and Design tool for DSP Systems MATLAB, DSP using MATLAB.

Computational Accuracy in DSP Implementations: Number formats for signals and coefficients in DSP systems, Dynamic Range and Precision, Sources of error in DSP implementations, A/D Conversion errors, DSP Computational errors, D/A Conversion Errors, Compensating filter.

UNIT-II

Architectures for Programmable DSP Devices: Basic Architectural features, DSP Computational Building Blocks, Bus Architecture and Memory, Data Addressing Capabilities, Address Generation Unit, Programmability and Program Execution, Speed Issues, Features for External interfacing.

Execution Control and Pipelining: Hardware looping, Interrupts, Stacks, Relative Branch support, Pipelining and Performance, Pipeline Depth, Interlocking, Branching effects, Interrupt effects, Pipeline Programming models.

UNIT-III

Programmable Digital Signal Processors : Commercial Digital signal-processing Devices, Data Addressing modes of TMS320C54XX DSPs, Data Addressing modes of TMS320C54XX

Processors, Memory space of TMS320C54XX Processors, Program Control, TMS320C54XX instructions and Programming, On- Chip Peripherals, Interrupts of TMS320C54XX processors, Pipeline Operation of TMS320C54XX Processors.

UNIT-IV

Implementations of Basic DSP Algorithms : The Q-notation, FIR Filters, IIR Filters, Interpolation Filters, Decimation Filters, PID Controller, Adaptive Filters, 2-D Signal Processing.

Implementation of FFT Algorithms : An FFT Algorithm for DFT Computation, A Butterfly Computation, Overflow and scaling, Bit-Reversed index generation, An 8-Point FFT implementation on the TMS320C54XX, Computation of the signal spectrum.

UNIT-V

Interfacing Memory And I/O Peripherals to Programmable DSP Devices : Memory space organization, External bus interfacing signals, Memory interface, Parallel I/O interface, Programmed I/O, Interrupts and I/O, Direct memory access (DMA). A Multichannel buffered serial port (McBSP), McBSP Programming, a CODEC interface circuit, CODEC programming, A CODEC-DSP interface example.

TEXT BOOKS:

1. Avtar Singh and S. Srinivasan, “Digital Signal Processing”, Thomson Publications, 2004.
2. Lapsley et al. S. Chand & Co, “DSP Processor Fundamentals, Architectures & Features”, 2000.

REFERENCES:

1. B. Venkata Ramani and M. Bhaskar, “Digital Signal Processors, Architecture, Programming and Applications”, TMH, 2004.
2. Jonatham Stein, “Digital Signal Processing”, John Wiley, 2005.

IV B.Tech I Sem (E.C.E)

SOFTWARE DEFINED RADIO
(CBCC-I)

L	T	P	C
3	1	0	3

Course Objectives:

i. To study about requirements, benefits and different models for Software Defined Radio
ii. To study in detail about Soft ware Defined Radio Architectures for performance optimization
iii. To get complete knowledge regarding functioning of different blocks and techniques associated with Software Defined Radio.

Learning Outcomes:

After completion of this course the students will be able to

a. Analyze requirements, benefits and different models for Software Defined Radio.
b. Understand in detail about Soft ware Defined Radio Architectures for performance optimization.
c. Gets complete knowledge regarding functioning of different blocks and techniques associated with Software Defined Radio.

UNIT-I

Requirement for Software defined radio, Benefits of multi-standard terminals, Operational requirements, models for SDR, Smart antenna systems,

UNIT - II

Software defined radio architectures, Hardware specifications, Digital aspects of Software defined radio, Current technology limitations, minimum power consumption, ADC performance trends

UNIT-III

Flexible RF receiver architectures, Digital receiver, Single carrier and multi-carrier designs, under sampling, oversampling, Noise figure, Receiver sensitivity, ADC spurious signals

UNIT-IV

Multiband Flexible receiver design, RF Transmit / receive switch, Image rejection mixing, Dynamic range enhancement, Feed forward techniques, cascaded non-linearity techniques

UNIT - V

Flexible transmitters,, Power amplifiers, Analog quadrature up conversion, Interpolated band-pass up conversion, PLL based modulator transmitter, All-pass filtering, Poly-phase filtering

Text Books:

1. P Kenington, “RF and Baseband Techniques for Software Defined Radio”, Artec House, 2005
2. Jouko Vanakka, “Digital Synthesizers And Transmitter For Software Radio”, Springer, 2005

References:

1. Wally H. W. Tuttlebee**, “**Software Defined Radio: Baseband Technologies for 3G Handsets and Base stations”,John Wiley & Sons, 2003

IV B.Tech I Sem (E.C.E)

BIO-MEDICAL INSTRUMENTATION
(CBCC-II)

L	T	P	C
3	1	0	3

Course Objectives:

1. To understand the functioning of Human Cell and its electrical characteristics.
2. To get Sufficient knowledge about Cardiovascular measurement and circulatory System of heart
3. To get familiarize with pace makers and Defibrillators
4. To understand about the electrical hazards that may occur during the usage of medical instruments

Learning Outcomes: After completion of this course the student will be able to

a. Explain the functioning of Human Cell and its electrical characteristics
b. Acquire knowledge about Cardiovascular measurement and circulatory System of heart
c. Familiarize with pace makers and Defibrillators
d. Know about the electrical hazards that may occur during the usage of medical instruments

UNIT-I

Human cell and its Electrical characteristics neuron and impulses, Recording Electrodes – Electrode-Electrolyte interface, polarizable – Non-polarizable Electrodes, body surface recording Electrodes, internal Electrodes, Micro Electrodes, Electrode array & Practical hints in using Electrodes.

UNIT-II

Bioelectric potential and cardiovascular measurement circulatory system of heart – ECG Anatomy & Function of heart abnormal cardiac Rhythms – Arrhythmias – Einthoven triangle.
EEG recording system (10-20 electrode System) Biorhythms – Sleep pattern

UNIT-III

Therapeutic and prosthetic devices, Cardiac pace maker, Types – Asynchronous and Synchronous modes of operation (Demand). Asynchronous pace maker – Working principle and Function demand PM – Working principle – QRS triggered and atrioventricular Synchronized PM lead wires and Electrodes, Cardioverter.
Defibrillator : Working principle of DC Defibrillation Electrodes used. Infant incubator and Lithotripry.

UNIT-IV

Electrical Hazards in medical instruments macro and micro shock – devices to protect against electrical hazards – Ground fault interrupter, isolation transformer, line isolation monitor, receptacle tester, electrical safety analyzer equipment, preventive maintenance.

UNIT-V

Image Systems: Introduction, Basic principle and block diagram of x-ray machine, x-ray computed topography (C.T. Scanner) and Nuclear Magnetic resonance (NMR) Short-wave Diathermy, Microwave Diathermy, Ultrasound Therapy unit.

Recent trends: Ultrasonography -Introduction, medical ultrasound, block diagram of pulse echo-system, A-Scan, M-mode, B-scanner and real time ultrasound imaging systems – lasers principle and operation of laser types of lasers – Pulsed Ruby laser – ND-YAG laser – Helium –Neon laser-Argon laser-C02 laser exciner laser, Semiconductor lasers – Laser safety.

TEXT BOOKS:

1. John G.Webser, "Medical Instrumentation Applications and Design" John Wiley & Sons (1998).
2. Seslie Cromwell, Fred J.Weibell and Esich A.Plefittes, "BioMedical Instrumentation & measurements", Pearson Education, 9th edition.

REFERENCES:

1. RS Khandpur, "Handbook of BioMedical Instrumentation", Tata Mc Graw Hill.
2. Walter Welko- Witiz and Sid Doutsch, "Biomedical Instruments: Theory and Design"

IV B.Tech -I Sem (E.C.E)

T.V. ENGINEERING
(CBCC-II)

L	T	P	C
3	1	0	3

Course Objectives:

1. To understand working principles of Monochrome and color television
2. To gain sufficient knowledge regarding different modules present in the TV transmitter and receiver and their design considerations
3. To get adequate knowledge regarding functioning of modern televisions system such as DTH

Learning Outcomes: After completion of this course the student will be able to

a. Get complete knowledge regarding the working principles involved in both Monochrome and Color Television
b. Get Adequate knowledge regarding different modules present in the TV transmitter and receiver and their design considerations
c. Get familiarized with principles involved in the of functioning of modern televisions system such as DTH

UNIT-I

Fundamentals of Television :Geometry form and Aspect Ratio - Image Continuity - Number of scanning lines - Interlaced scanning - Picture resolution - Camera tubes- Image orthicon - vidicon-plumbicon-silicon diode array vidicon-solid state image scanners- monochrome picture tubes- composite video signal-video signal dimension- horizontal sync. Composition- vertical sync. Details – functions of vertical pulse train – scanning sequence details. Picture signal transmission – positive and negative modulation – VSB transmission sound signal transmission– standard channel bandwidth.

UNIT-II

Monochrome Television Transmitter and Receiver : TV transmitter – TV signal propagation – Interference – TV transmission Antennas – Monochrome TV receiver – RF tuner – UHF, VHF tuner- Digital tuning techniques- AFT-IF subsystems - AGC – Noise cancellation- Video and sound inter carrier detection- vision IF subsystem- video amplifiers requirements and configurations - DC re-insertion - Video amplifier circuits- Sync separation – typical sync processing circuits- Deflection current waveform – Deflection Oscillators – Frame deflection circuits – requirements- Line Deflection circuits – EHT generation – Receiver Antennas.

UNIT-III

Essentials of Colour Television : Compatibility – colour perception- Three colour theory- luminance, hue and saturation-colour television cameras- values of luminance and colour difference signals- colour television display tubes- delta – gun-precision – in-line and Trinitron colour picture tubes- purity and convergence- purity and static and dynamic convergence adjustments- pincushion correction techniques- automatic degaussing circuit- grey scale tracking – colour signal transmission- bandwidth- modulation of colour difference signals – weighting factors- Formation of chrominance signal.

UNIT-IV

Colour Television systems: NTSC colour TV system- NTSC colour receiver- limitations of NTSC system – PAL colour TV system – cancellation of phase errors- PAL –D colour system-

PAL coder – Pal-Decolour receiver- chromo signal amplifier- separation of U and V signals-colour burst separation – Burst phase Discriminator – ACC amplifier- Reference Oscillator-Ident and colour killer circuits- U and V demodulators- Colour signal matrixing – merits and demerits of the PAL system – SECAM system – merits and demerits of SECAM system.

UNIT-V

Advanced Television Systems : Satellite TV technology: Cable TV, digital television, Transmission and reception, projection Television, Flat panel display TV receiver, Stereo sound in TV, 3D TV, EDTV, HDTV, Digital equipments for TV studios.

TEXT BOOKS:

2. R.R.Gulati, " Monochrome Television Practice, Principles, Technology and servicing, New age International Publishes, Second edition, 2004.
3. R.R.Gulati "Monochrome and colour television ", New age International Publisher, 2003.

REFERENCES:

1. A.M Dhake, "Television and Video Engineering", TMH, Second edition, 2003.
2. S.P.Bali, " Color Television, Theory and Practice", TMH, 1994.

IV B.Tech I Sem (E.C.E)

ADVANCEDDSP
(CBCS-II)

L	T	P	C
3	1	0	3

Course Objectives:

i. To study about the digital signal processing algorithms and multi rate signal processing
ii. To study about the power spectral estimation by using Barlett, Welch & Blackmann & Tukey methods.
iii. The study about the effects of finite word length in fixed-point dsp systems.

Learning Outcomes:

After completion of the course students will be able to

a. Provided complete knowledge regarding various algorithms associated with Digital signal processing and multi rate signal processing.
b. Verify the power spectral estimation by using Barlett, Welch & Blackmann & Tukey methods.
c. Know the effects of finite word length in fixed-point DSP systems by using ADC and FFT algorithms.

UNITI

DSP Algorithems: Fast DFT algorithms based on Index mapping, Sliding Discrete Fourier Transform, DFT Computation Over a narrow Frequency Band, Split Radix FFT, Linear filtering approach to Computation of DFT using Chirp Z-Transform.

UNITII

MultiRateSignalProcessing:DecimationbyafactorD,Interpolationbya factorI, Sampling rateconversionbyarationalfactorI/D,Filterdesign&Implementationforsamplingrateconversion.

UNITIII

PowerSpectralEstimation:Estimationofspectrafromfinitedurationobservationofsignals, Non-parametricmethods: Bartlett, Welch&Blackmann&Tukeymethods.
ParametricMethodsforPowerSpectrumEstimation:Relationbetweenautocorrelation &modelparameters,Yule-Waker&BurgMethods,MA&ARMAmodelsforpowerspectrumestimation.

UNIT IV

AnalysisofFiniteWordlengthEffectsinFixed-PointDSPSystems:Fixed, FloatingPoint Arithmetic– ADC quantizationnoise&signalquality-Finiteword lengtheffectinIIRdigitalFilters–Finiteword-length effects in FFT algorithms.

UNIT V

Applications Of Digital Signal Processing: Dual Tone Multi-frequency Signal Detection, Spectral Analysis of Sinusoidal Signals, Spectral Analysis of Non stationary Signals, Musial Sound Processing, Over Sampling A/D Converter, Over Sampling D/A Converter, Discrete-Time Analytic Signal Generation.

TEXTBOOKS:

1. Sanjit K Mitra, “DigitalSignal Processing”, Tata MCgraw Hill Publications.
2. J G Proakis, D G Manolokis, “DigitalSignal Processing Principles, Algorithms, Applications” PHI.

REFERENCES:

1. A V Oppenhiem, R W Schafer, “Discrete-Time Signal Processing”, Pearson Education.
2. Emmanuel C Ifeacher Barrie. W. Jervis, “DSP- A Practical Approach”, Pearson Education.
3. S.M.Kay, “ModernspectralEstimation Techniques”PHI,1997

IV B.Tech I Sem (E.C.E)

VLSI & EMBEDDED SYSTEMS LABORATORY

L	T	P	C
0	0	3	2

Note: The students are required to perform any Five Experiments from each Part of the following.

Part-A: VLSI Lab

Course Objectives:

1. To design and draw the internal structure of the various digital integrated circuits
2. To develop VHDL source code, perform simulation using relevant simulator and analyze the obtained simulation results using necessary synthesizer.
3. To verify the logical operations of the digital IC's (Hardware) in the laboratory.

Learning Outcomes: After completion of the course the students will be able to

a. Design and draw the internal structure of the various digital integrated circuits
b. Develop VHDL source code, perform simulation using relevant simulator and analyze the obtained simulation results using necessary synthesizer.
c. Verify the logical operations of the digital IC's (Hardware) in the laboratory

List of Experiments:

1. Realization of Logic Gates.
2. 3 to 8 Decoder- 74138.
3. 8 x 1 Multiplexer-74151 and 2 x 4 De-multiplexer-74155.
4. 4-Bit Comparator-7485.
5. D Flip-Flop-7474.
6. Decade counter-7490.
7. Shift registers-7495.
8. ALU Design.

Equipment Required:

1. Xilinx ISE Software.
2. Digital IC's.
3. Personal Computers.
4. Necessary Hardware Kits.

Part-B: Embedded Systems Lab

Course Objectives:

1. To develop an algorithm, the flow diagram, source code in Embedded C and, perform the compilation
2. To generate the required binary file which can be dumped into the controller and obtain the respective output control on the connected peripheral.
3. To verify the logic with the necessary hardware.

Learning Outcomes: After completion of the course the students will be able to

a. Develop an algorithm, the flow diagram, source code in Embedded C and, perform the compilation.
b. Generate the required binary file which can be dumped into the controller and obtain the respective output control on the connected peripheral.
c. Verify the logic with the necessary hardware.

<u>List of Experiments:</u>

Experiments are based upon MSP430/ARM Processors

1) Interfacing and programming GPIO ports in C (blinking LEDs, Push buttons)
2) Usage of low power modes: Use MSPEXP430FR5969 as hardware platform and demonstrate the low power modes and measure the active mode standby mode current.
3) Interrupt programming examples through GPIOs
4) PWM based speed control of Motor controlled by potentiometer connected to GPIO
5) Using ULP advisor in Code Composer Studio
6) Master slave communication between 2 MSP430s using SPI
7) A basic Wi-Fi application-Communication between two sensor nodes
8) Computer total energy of an application (Experiment 4 or Experiment 7) and estimated life time of a battery.

IV B.Tech I Sem (E.C.E)

MICROWAVE & OPTICAL COMMUNICATIONS LAB

L	T	P	C
0	0	3	2

Course Objectives:

1. To verify the characteristics of various microwave components using microwave test bench.
2. Initiate an expose the newcomers to exciting area of optical communication

Learning Outcomes:

a. Students acquire applications and testing of microwave components.
b. Students acquire knowledge on the various applications of optical fiber communications
c. Students develop confidence for self education and ability for life -long learning.

PART-A: Microwave Lab - Any Seven (7) Experiments

1. Reflex Klystron Characteristics.
2. Gunn Diode Characteristics.
3. Attenuation Measurement.
4. Directional Coupler Characteristics.
5. VSWR Measurement.
6. Impedance Measurement.
7. Frequency and Wavelength measurements using slotted section.
8. Scattering parameters of Directional Coupler.
9. Scattering parameters of Magic Tee.
10. Radiation Pattern Measurement of horn Antennas (at least two antennas).

PART-B: Optical Fiber Lab - Any five (5) Experiments

1. Characterization of LED.
2. Characterization of Laser Diode.
3. Intensity modulation of Laser output through an optical fiber.
4. Measurement of Data rate for Digital Optical link.
5. Measurement of Numerical Aperture of the given fiber.
6. Measurement of losses for Analog Optical link.

Equipment required for Laboratories:

1.	Regulated Klystron Power Supply	6 nos.
2.	VSWR Meter	6 nos.
3.	Milli/Micro Ammetersn	10 nos.
4.	Multi meters	10 nos.
5.	CROs	8 nos.
6.	GUNN Power Supply, Pin Moderator	4 nos.
7.	Reflex Klystron with mount	10 nos.
8.	Crystal Diodes	50 nos.
9.	Micro wave components (Attenuation)	10 nos.
10.	Frequency Meter (Direct frequency)	10 nos.
11.	Slotted line with carriage	10 nos.

12. Probe detector 10 nos.
13. Wave guide shorts 6 nos.
14. Pyramidal/conical Horn Antennas 4 nos.
15. Rectangular to circular transition 2 nos.
16. Directional Couplers with different (coupling factors) 5 nos.
17. E, H, Magic Tees 2 nos. each.
18. Circulators, Isolator 10 nos.
19. Matched Loads 30 nos.
20. Antenna Training System with Tripod and Accessories 1no.
21. Fiber Optic Analog Trainer based LED 3 nos.
22. Fiber Optic Analog Trainer based laser 2nos.
23. Fiber Optic Digital Trainer 1 no.
24. Fiber cables - (Plastic, Glass)

IV B.Tech II Sem (E.C.E)

MOBILE COMMUNICATION

L	T	P	C
3	1	0	3

Course Objectives:
1. To learn about the evolution process analog cellular system and its working operation.
2. To enable the student to study the mobile radio channels and their effects.
3. To understand various digital modulation techniques used in cellular systems.
4. To enable the student to acquire the knowledge about various diversity and other schemes to improve the signal quality at the receiver.

Learning Outcomes: This course provides the students to learn fundamental concepts of cellular concepts in mobile communications. At the end of the semester, they should be able to:
a. Know the types of mobile channels & their effects on the reception of signal strength.
b. Analyze the received signal characteristics.
c. Understand various digital modulation schemes used in cellular communications.
d. Design suitable receiver systems to Counter balance the effects of the mobile channel on the received signal.

UNIT – I

Mobile Radio & its Signal Environment: Introduction, Cellular network planning, The mobile radio communication medium, Propagation path loss, Multipath fading due to scattering factors, Delay spread, Coherence bandwidth, Multipath fading phenomenon, Review of statistical communication theory – Probability density functions & Level crossing rate.

UNIT – II

Path loss over Flat & Hilly Terrains: Path loss prediction based on model analysis, Diffraction loss, Diffraction loss over rounded hills, Path clearance criteria, Lee's Macro-cell & Microcell models, Inbuilding prediction models, Signal threshold prediction, Signal coverage area prediction, Wideband signal propagation.

UNIT – III

Received Signal Characteristics: Short term versus long term fading, Model analysis of short term fading, Cumulative probability distribution (CPD) , Level crossing rate, Calculating the average duration of fades, Random variables related to mobile radio signals, Phase correlation characteristics, Simulation models.

UNIT – IV

Modulation Technology: Digital modulation for non-fading and fading cases, Constant envelope modulation – QPSK, OQPSK, $\pi/4$ - DQPSK, GMSK, OFDM modem, brief introduction to spread spectrum systems – Direct sequence, Frequency hopped modulation schemes.

UNIT – V

Diversity Schemes & Interference Problems: Diversity schemes – Space diversity, Polarization diversity, Frequency diversity, & Time diversity (qualitative treatment only), Effects of interference, Co-channel interference, Adjacent channel interference, Hand off – different types of hand off mechanisms, Near-end, to Far-end ratio interference, inter-modulation interference, Inter-symbol interference.

TEXT BOOKS:

1. William C. Y. Lee, “Mobile Communication Engineering – Theory and Applications,” McGraw Hill Education Private Limited, Second Edition – 2008.
2. Gordon L. Stuber, “Principles of Mobile Communication,” Kluwer Acadeimic Publishers, Second Edition – 2001.

REFERENCES:

1. William C. Y. Lee, “Mobile Cellular Telecommunications – Analog and Digital Systems,” McGraw Hill, Second Edition – 2006.
2. G. Sasibhushana Rao, “Mobile Cellular Communication,” Pearson, 2013.

B.TECH. IV Year II sem (ECE)

MANAGEMENT SCIENCE

L	T	P	C
3	1	0	3

Course objectives

1. To analyze the characteristics and contributions of enterprising people
2. To assess their own entrepreneurial and enterprising potential To develop an understanding of the general role of Small Business Enterprises
3. To develop skills to start, run and manage SMEs
4. Understand the role of entrepreneurship in economic development.
5. Identify the general characteristics of entrepreneurs.
6. Know the differences between entrepreneurial and managerial type jobs.
7. Understand the significance and sources of capital. Participate in the preparation of a complete business plan.
8. Have an understanding of individual personalities and interpersonal skills needed for effective communications in a diverse business environment.
9. Have an introductory understanding of global entrepreneurship concepts.
10. Acquire entrepreneurial quality, competency & motivation.
11. Understand the concept & process of entrepreneurship- its contribution & role in the growth & development of individual & the nation.

UNIT I

Introduction To Management:

Concepts of Management Nature - importance and Functions of Management, Taylor‘s Scientific Management Theory, Fayol‘s Principles of Management, Maslow‘s Theory of Human Needs, Douglas McGregor‘s Theory X and Theory Y, Leadership Styles, Social responsibilities of Management.

Designing Organizational Structures:

Basic concepts related to Organisation - Departmentation and Decentralization, Types of mechanistic and organic structures of organization (Line organization, Line and staff organization, functional organization, Committee organization, matrix organization, team structure) their merits, demerits and suitability.

UNIT II

Operations Management:

Principles and Types of Plant Layout-Methods of production (Job, batch and Mass Production), Work Study. Statistical Quality Control**:**c chart, p chart, (simple Problems) Deming‘s contribution to quality.

Materials Management: EOQ, ABC Analysis, Purchase Procedure and Stores Management. Inventory — functions. Types, inventory classification techniques.

Marketing: Functions of Marketing, Marketing Mix, and Marketing Strategies based on Product Life Cycle, Channels of distribution.

UNIT III

Human Resources Management (HRM):

Concepts of HRM ,Personnel Management and Industrial Relations (PMIR), Basic functions of HR Manager: Manpower planning, Recruitment, Selection, Training and Development, Placement, Wage and Salary Administration, Promotion, Transfer, Separation, Performance Appraisal, Grievance Handling and Welfare Administration, Job Evaluation, Merit Rating and methods.

UNIT IV

Strategic Management:

Vision, Mission, Goals, Objectives, Policy, Strategy, Programmes, Elements of Corporate Planning Process, Environmental Scanning, Value Chain Analysis, SWOT Analysis, Steps in Strategy Formulation and Implementation, Generic Strategy alternatives.

Project Management (PERT/CPM):

Network Analysis, Programme Evaluation and Review Technique (PERT), Critical Path Method (CPM), Identifying critical path, Probability of Completing the project within given time, Project Cost Analysis, Project Crashing. (Simple problems).

UNIT V

Contemporary Management Practices:

Basic concepts of MIS, Materials Requirement Planning (MRP), Just-In-Time (JIT) System, Total Quality Management (TQM), Six sigma concept, Supply Chain Management, Enterprise Resource Planning (ERP), Performance Management, Business Process outsourcing (BPO), Business Process Re-engineering and Bench Marking, Balanced Score Card.

Assignments, case studies And mini project.

TEXT BOOKS:

1. Aryasri: Management Science, TMH, 2004.
2. Stoner, Freeman, Gilbert, Management, 6th Ed, Pearson Education,New Delhi, 2004.

REFERENCES:

1. Kotler Philip & Keller Kevin Lane: Marketing Mangement 12/e, PHI,2005.
2. Koontz & Weihrich: Essentials of Management, 6/e, TMH, 2005.
3. Thomas N.Duening & John M.Ivancevich Management—Principles and Guidelines, Biztantra, 2003.
4. Kanishka Bedi, Production and Operations Management, Oxford University Press, 2004.
5. Memoria & S.V.Gauker, Personnel Management, Himalaya, 25/e, 2005
6. Samuel C.Certo: Modern Management, 9/e, PHI, 2005
7. Schermerhorn, Capling, Poole & Wiesner: Management, Wiley, 2002.
8. Parnell: Strategic Management, Biztantra, 2003.
9. Lawrence R Jauch, R.Gupta &William F.Glueck: Business Policy and Strategic Management, Frank Bros., 2005.
10. L.S.Srinath: PERT/CPM,Affiliated East-West Press, 2005.

Learning Outcome

The M.S. prepares engineers for a lifelong career addressing the critical technical and managerial needs of private and public organizations. The program emphasizes developing analytic abilities, making better decisions, developing and executing strategies while also leading people who innovate. Unlike an MBA, our master's program addresses the technical as well as the behavioral challenges of running organizations and complex systems. We emphasize quantitative analytic skills and an entrepreneurial spirit.

R15 REGULATIONS

COURSE STRUCTURE

FOR

B.TECH –ELECTRONICS AND COMMUNICATION ENGINEERING

w.e.f.

2015 ADMITTED BATCH

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

COLLEGE OF ENGINEERING (AUTONOMOUS) :: PULIVENDULA

Y.S.R. (DIST), ANDHRA PRADESH, INDIA–516390.

COURSE STRUCTURE OF R15 REGULATIONS FOR B.TECH IN ELECTRONICS AND COMMUNICATION ENGINEERING

B. Tech I Year I Semester

S.No.	Course Code	Subject Name	Theory/Tutorial	Drawing/Lab	Credits
1	15AHS01	Functional English	3+1	-	3
2	15ABS06	Mathematics - I	3+1	-	3
3	15ACS01	Computer Programming	3+1	-	3
4	15ABS01	Engineering Physics	3+1	-	3
5	15AME01	Engineering Drawing	1	3	3
6	15AEC02	Network Analysis	3+1	-	3
7	15AHS02	English Language Communication Skills Lab	3+1	-	2
8	15ACS02	Computer Programming Lab	-	3	2
9	15ABS02	Engineering Physics Lab	-	3	2
		Total	25	09	24

B. Tech I Year II Semester

S.No.	Course Code	Subject Name	Theory/Tutorial	Drawing/Lab	Credits
1	15AHS03	English for Professional Communication	3+1	-	3
2	15ABS07	Mathematics - II	3+1	-	3
3	15ABS03	Engineering Chemistry	3+1	-	3
4	15ABS05	Environmental Studies	3+1	-	3
5	15ACS04	Data Structures	3+1	-	3
6	15AEC01	Electronic Devices and Circuits	3+1	-	3
7	15ACS05	Data Structures Lab	-	3	2
8	15ABS04	Engineering Chemistry Lab	-	3	2
9	15AME03	Engineering & IT Workshop Lab	-	3	2
		Total	24	09	24

II Year I Semester

S.No.	Course Code	Subject Name	Theory/Tutorial	Drawing/ Lab	Credits
1	15ABS08	Mathematics – III	3+1	-	3
2	15AEC05	Signals and Systems	3+1	-	3
3	15AEC06	Switching Theory and Logic Design	3+1	-	3
4	15AEE10	Electrical Technology	3+1	-	3
5	15AEC07	Probability Theory and Stochastic Processes	3+1	-	3
	Choice based credit course of inter department		3+1	-	3
	ANNEXURE-I				
7	15AEC03	Electronic Devices and Circuits Lab	-	3	2
8	15AEE11	Electrical Technology Lab	-	3	2
9	15AHS04	Human Values and Professional Ethics (Audit Course)	2		
		Total	26	6	22

ANNEXURE-I

Choice Based Credit Course of Inter Department
offered in

B.TECH II YEAR I SEMESTER

BRANCH	SUBJECT CODE	SUBJECT NAME
PHYSICS	15ABS12	Basics of Nano Science and Nano Technology
MATHEMATICS	15ABS14	Set Theory and Mathematical Logic
	15ABS23	Mathematical Modeling
CHEMISTRY	15ABS15	Green Chemistry and Catalysis for Sustainable Environment
	15ABS16	Instrumental Methods of Chemical Analysis
	15ABS17	Chemistry of Nano Material and Application
ENGLISH	15AHS08	Campus Recruitment Training & Soft Skills
	15AHS09	Competitive & Spoken English
CE	15ACE09	Green Buildings
	15ACE10	Disaster Management and Mitigation
	15ACE11	Water Harvesting and Conservation
ECE	15AEC08	Basic Electronics
	15AEC09	Fundamentals of Digital Electronics
	15AEC10	Electronic Measurements & Instrumentation
ME	15AME11	Robotics
	15AME12	Mechanical Manufacturing Process
	15AME13	Non-Conventional Sources of Energy
EEE	15AEE08	Principles of electrical engineering
	15AEE01	Electrical engineering materials
	15AEE09	Electrical measuring instruments
CSE	15ACS04	Data Structures
	15ACS11	Object oriented Programming
	15ACS08	Operating Systems

II Year II Semester

S.No.	Course Code	Subject Name	Theory/Tutorial	Drawing/Lab	Credits
1	15ABS10	Mathematics – IV	3+1	-	3
2	15AHS05	Managerial Economics & Financial Analysis	3+1	-	3
3	15AEC11	Control Systems Engineering	3+1	-	3
4	15AEC13	Electronic Circuit Analysis and Design	3+1	-	3
5	15AEC14	Pulse and Digital Circuits	3+1	-	3
6	15AEC15	Electromagnetic Waves and Transmission Lines	3+1	-	3
7	15AEC16	Electronic Circuit Analysis and Design Lab		3	2
8	15AEC17	Pulse and Digital Circuits Lab	-	3	2
9	15AEC18	Comprehensive Online Examination	-		1
		Total	26	6	23

III YEAR I SEMESTER

S.No.	Course Code	Subject Name	Theory /Tutorial	Drawing /Lab	Credits
1	15ACS18	Computer Architecture And Organization	3+1	-	3
2	15AEC24	Analog Communication Systems	3+1	-	3
3	15AEC25	Linear IC Applications	3+1	-	3
4	15AEC26	Digital IC Applications	3+1	-	3
5	15AEC27	Electronic Measurements & Instrumentation	3+1	-	3
6	15AEC28	Antennas And Wave Propagation	3+1	-	3
7	15AEC29	Analog Communication Systems Lab	--	3	2
8	15AEC30	IC Applications Lab	-	3	2
9	15AHS06	Advanced Communication Skills Lab (Audit Course)	-	-	-
		TOTAL	24	6	22

III YEAR II SEMESTER

S.No.	Course Code	Subject Name	Theory /Tutorial	Drawing /Lab	Credits
1	15AHS07	Management Sciences	3+1	-	3
2	15AEC31	Digital Communication Systems	3+1	-	3
3	15AEC32	Microprocessors And Microcontrollers	3+1	-	3
4	15AEC33	Digital Signal Processing	3+1	-	3
5		**MOOC-I**	3+1	-	3
6	**CHOICE BASED CREDIT COURSE OF INTER DEPARTMENT**				
7	15AEC37	Microprocessor And Microcontrollers Lab	-	3	2
8	15AEC38	Digital Communication Systems Lab	-	3	2
9	15AEC39	Comprehensive Online Examination	-	-	1
		TOTAL	24	8	23

ANNEXURE-II

CHOICE BASED CREDIT COURSE OF INTER DEPARTMENT

Branch	Subject Code	Subject Name
MATHEMATICS	15ABS18	FUZZY SETS AND APPLICATIONS
	15ABS19	OPTIMIZATION TECHNIQUES
CHEMISTRY	15ABS20	CHEMISTRY ENERGY MATERIALS
	15ABS21	CHEMISTRY OF LIFE
	15ABS22	CHEMISTRY OF POLYMERS AND THEIR APPLICATIONS
CE	15ACE35	REMOTE SENSING & GIS
	15ACE36	ENVIRONMENTAL IMPACT ASSESTMENT & MANAGEMENT
	15ACE37	FINITE ELEMENT METHODS
EEE	15AEE19	POWER ELECTRONICS
	15AEE34	RENEWABLE ENERGY SOURCES
	15AEE35	UTILIZATION OF ELECTRICAL ENERGY
ME	15AME35	OPTIMIZATION TECHNIQUES BY MATLAB
	15AME36	MECHATRONICS & MEMS
	15AME37	AUTOMOTIVE ELECTRONICS
ECE	15AEC34	FUNDAMENTALS OF COMMUNICATION SYSTEMS
	15AEC35	INDUSTRIAL ELECTRONICS
	15AEC36	NEURAL NETWORKS & FUZZY LOGIC
CSE	15ACS35	MOBILE COMPUTING
	15ACS36	OPTIMIZATION TECHNIQUES
	15ACS37	MACHINE LEARNING

IV YEAR I SEMESTER

S.No.	Course Code	Subject Name	Theory /Tutorial	Drawing /Lab	Credits
1	15AEC51	Microwave Engineering	3+1	-	3
2	15AEC52	Optical Fiber Communications	3+1	-	3
3	15AEC53	VLSI Design	3+1	-	3
4		**MOOC-II**	3+1	-	3
5		CHOICE BASED CREDIT COURSES (**DEPARTMENT SPECIFIC**)	3+1	-	3
	15AEC54	Digital Image Processing			
	15AEC55	DSP Processors And Architectures			
	15AEC56	Cyber Security			
6		CHOICE BASED CREDIT COURSES (**DEPARTMENT SPECIFIC**)	3+1	-	3
	15AEC57	Bio-Medical Instrumentation			
	15AEC58	Satellite Communications			
	15AEC59	Advanced DSP			
7	15AEC60	DSP And VLSI Lab	-	4	2
8	15AEC61	Microwave And Optical Communications Lab	-	4	2
		TOTAL	24	8	22

IV YEAR II SEMESTER

S.No.	Course Code	Subject Name	Theory /Tutorial	Drawing /Lab	Credits
1	15AEC81	Embedded Systems And IOT	3+1	-	3
2	15AEC82	Radar And Navigational Aids	3+1	-	3
3	15AEC83	Wireless Communications	3+1	-	3
4		**MOOC-III**	3+1	-	3
5	15AEC99	Seminar And Project Work		20	10
		TOTAL	16	20	22

I B.Tech I Sem

15AHS01-FUNCTIONAL ENGLISH
(Common For All Branches)

L	T	P	C
3	1	0	3

1. Introduction:

English is an international language as well as a living and vibrant one. People have found that knowledge of English is a passport for better career, better pay, and advanced knowledge and for communication with the entire world. As it is a language of opportunities in this global age, English is bound to expand its domain of use everywhere. The syllabus has been designed to enhance communication skills of the students of engineering and pharmacy. The prescribed books serve the purpose of preparing them for everyday communication and to face the global competitions in future.

The texts prescribed for detailed study focus on LSRW skills and vocabulary development. The teachers should encourage the students to use the target language. The classes should be interactive and learner-centered. They should be encouraged to participate in the classroom activities keenly.

In addition to the exercises from the text done in the class, the teacher can bring variety by using authentic materials such as newspaper articles, advertisements, promotional material etc.

2. Objectives:

1. To enable the students to communicate in English for academic and social purpose.
2. To enable the students to acquire structure and written expressions required for their profession.
3. To develop the listening skills of the students.
4. To inculcate the habit of reading and critical thinking skills.
5. To enhance the study skills of the students with emphasis on LSRW skills.

3. SYLLABUS:

UNIT –I

Reading: What Is My Name? —P Sathyavathi
Writing: Paragraph writing
Listening: Listening for sounds, stress
Functional English: Greeting, taking leave and introducing oneself and others
Grammar: Nouns -classification
Vocabulary: Homonyms
Non Detailed Study: Listening Skills from English and Soft Skills

UNIT-II

Reading : SWOT Analysis of the Indian software Industry (from Mindscapes)
Writing : Essay Writing
Listening : Listening for theme -1
Functional English: Making requests
Grammar: Pronouns
Vocabulary : Homophones
Non detailed Study: Teamwork Skills

verified
checked

UNIT-III
Reading : How To Regain Green Cover? (From Mindscapes)
Writing Descriptive essays
Listening :Listening for theme -2
Functional English : Asking for the time and directions
Grammar: Articles
Vocabulary : Homographs
Non detailed Study : Emotional Intelligence Skills
UNIT-IV
Reading : The Kitchen — Vimala
Writing Narrative essays- Expository essays - Argumentative essays
Listening: Listening for main ideas
Functional English: Inviting -Apologizing
Grammar: Kinds of verbs – Auxiliaries- Adjectives
Vocabulary : Synonyms - Antonyms.
Non detailed Study : Assertive Skills
UNIT-V
Reading: Adivasis — Kancha Ilaiah
Writing: Letter Writing –official letters-business letters
Listening: Listening for details
Functional English: Interrupting - Asking for and giving opinions
Grammar: Tenses -Adverbs
Vocabulary: Prefixes -Suffixes
Non detailed Study: Learning Skills

Prescribed Text books:
Detailed text: **English for Fluency**, K Purushottam, Orient Black Swan,2013.
Non detailed text: **English and Soft Skills,** S P Danavel, Orient Black Swan 2013Edition.
References:

1. Mindscapes, English For Technologists And Engineers, Orient Black Swan,2012.
2. A Practical Course in Effective English Speaking Skills. J.K.Gangal, PHI, New Delhi.2012
3. Fundamentals of Technical Communication, Meenakshi Raman, Oxford University Press,2015.
4. Spoken English, R.K. Bansal & JB Harrison, Orient Longman,2013, 4Th edition.
5. Murphy's English Grammar with CD, Murphy, Cambridge University Press,3 Rd edition.
6. Advanced English Grammar , Martin Hewings Cambridge University Press 2007

Expected Outcomes:
At the end of the course, students would be expected to:
1. Have improved communication in listening, speaking, reading and writing skills in general.
2. Have developed their oral communication and fluency in group discussions and interviews.
3. Have improved awareness of English in science and technology context.
4. Have achieved familiarity with a variety of technical reports.

I B.Tech I Sem

15ABS06-MATHEMATICS – I
(Common For All Branches)

L	T	P	C
3	1	0	3

Objectives

- To train the students thoroughly in Mathematical concepts of ordinary differential equations and their applications.
- To prepare students for lifelong learning and successful careers using mathematical concepts of differential and Integral calculus, ordinary differential equations and vector calculus.
- To develop the skill pertinent to the practice of the mathematical concepts including the students' abilities to formulate and modeling the problems, to think creatively and to synthesize information.

UNIT – I

Exact, linear and Bernoulli equations, Applications to first order equations; Orthogonal trajectories, Simple electric circuits, Non-homogeneous linear differential equations of second and higher order with constant coefficients with RHS term of the type e^{ax}, sin ax, cos ax, polynomials in x, e^{ax} V(x), xV(x), Method of variation of parameters.

UNIT – II

Linear equations with variable coefficients: Euler-Cauchy Equations, Legendre's linear equation. Applications of linear differential equations- Mechanical and Electrical oscillatory circuits.

UNIT – III

Functions of Severable Variables:

Functions of severable variables, level curves, Limits, Continuity, Partial derivatives, chain Rule, Directional derivative, gradient vectors, Tangent planes & normal line, Maximum, Minimum & Saddle points of functions of two or three variables, Constrained Maxima & Minima, Method of Lagrange multipliers.

UNIT – IV

Multiple Integrals:

Double Integrals, Area, Change of integrals to Polar Coordinates, Change of order of integration, Triple Integrals in Cartesian, Cylindrical and Spherical Coordinates.

UNIT – V

Vector Calculus:

Line integral, work, circulation, flux, path independence, potential function, conservative fields; Green's theorem in the plane (without proof), Surface area & Surface Integral; Stokes theorem, Gauss divergence theorem (without proof) and simple problems.

2.7.2018

Text Books:

1. Higher Engineering Mathematics, B.S.Grewal, Khanna publishers.
2. Weir, MD, Hass J, Giordano FR: Thomas' Calculus Pearson education 11th ED, 2008.(Unit-III, IV & V)

References:

1. Engineering Mathematics-I, E. Rukmangadachari & E. Keshava Reddy, Pearson Publisher
2. Advanced Engineering Mathematics, by Erwin Kreyszig, Wiley India.
3. Higher Engineering Mathematics, by B.V.Ramana, Mc Graw Hill publishers.

Outcomes: At the end of the course, the student will be able to attain the abilities to use mathematical knowledge to analyze, formulate and solve problems in engineering applications, using Ordinary Differential Equations, Multiple Integrals and Vector Calculus.

2.7.2018

I B.Tech I Sem

15ACS01-COMPUTER PROGRAMMING
(Common For All Branches)

L T P C
3 1 0 3

Course Objectives:

- To make the student understand problem solving techniques
- Students will be able to understand the syntax and semantics of C programming language and other features of the language

Course Outcomes:

- Student can effectively apply problem solving techniques in designing the solutions for a wide-range of problems
- Student can choose appropriate data structure and control structure depending on the problem to be solved
- Student can modularize the problem and also solution

UNIT –I

Fundamentals of Computers: What is Computer, Applications of Computers, Evaluation of Computers, Generations of Computers, Basic I/O Devices, Computer Software, Types of computer, Software Development Methodology, Top-Down Vs Bottom –Up Approaches, Problem Solving, Fundamental Techniques to Solve The Problem, Representation of a solution to a Problem, Developing a computer program, Number Systems.

Fundamentals of C: An Overview of C, A Brief History of C , C Is a Middle-Level Language , C Is a Structured Language ,C Is a Programmer's Language Compilers Vs. Interpreters , The Form of a C Program, The Library and Linking, Separate Compilation, Compiling a C Program, C's Memory Map.

UNIT –II

Expressions: The Basic Data Types, Modifying the Basic Types, Identifier Names, Variables, The Four C Scopes, Type Qualifiers, Storage Class Specifiers,, Variable Initializations, Constants.

Operators: The Assignment Operator, Arithmetic Operators, The Increment and Decrement Operators, Relational and Logical Operators, Bitwise Operators, The ? Operator, The & and * Pointer Operators, The Compile-Time Operator sizeof, The Comma Operator, The Dot (.) and Arrow (–>) Operators, The [ ] and ( ) Operators, Precedence Summary, Expressions, Statements.

Conditional, unconditional and Iteration Statements: Selection Statements, Iteration Statements, Jump Statements, Expression Statements

UNIT –III

Arrays and Strings: Single-Dimension Arrays, Generating a Pointer to an Array, Passing Single Dimension Arrays to Functions , Strings, Two-Dimensional Arrays, Multidimensional Arrays, Indexing Pointers, Array Initialization, Variable-Length Arrays, A Tic-Tac-Toe Example.

Console I/O: Reading and Writing Characters, Reading and Writing Strings. Formatted Console I/O: printf( ), scanf( ), Suppressing Input.

Functions: The General Form of a Function, Understanding the Scope of a Function, Function Arguments, argc and argv— Arguments to main( ), The return Statement ,What Does main( ) Return? , Recursion, Function Prototypes, Declaring Variable Length Parameter Lists, The "Implicit int" Rule, Old Style Vs, Modern Function Parameter Declarations, The inline Keyword.

UNIT-IV

Pointers: What Are Pointers?, Pointer Variables, The Pointer Operators, Pointer Expressions, Pointer Assignments, Pointer Conversions, Pointer Arithmetic, Pointer Comparisons, Pointers and Arrays, Arrays of Pointers, Multiple Indirection, Initializing Pointers, Pointers to Functions, C's Dynamic Allocation Functions, Dynamically Allocated Arrays, restrict-Qualified Pointers, Problems with Pointers.

Structures, Unions, Enumerations, and typedef: Structures , Arrays of Structures, A Mailing List Example, Passing Structures to Functions, Structure Pointers, Arrays and Structures within Structures.

Unions, Bit-Fields , Enumerations, Using sizeof to Ensure Portability, typedef.

UNIT –V

File I/O: Standard C Vs. Unix File I/O, Streams and Files, File System Basics, fread( ) and fwrite(), Using fread( ) and fwrite( ), fseek( ) and Random-Access, fprintf( ) and fscanf( ), The Standard Streams, The Console I/O Connection, Using freopen( ) to Redirect the Standard Streams.

The Preprocessor and Comments: The Preprocessor, #define, #error, #include, Conditional Compilation Directives, #undef, Using defined, #line . #pragma, The # and ## Preprocessor Operators,Predefined Macro Names,Comments, Single-Line Comments.

Text book:

1. **"Computer Fundamentals and C Programming"** :Dr. P. Chenna Reddy, Professor of CSE, JNTUA College of Engg, Pulivendula, YSR District, Andhra Pradesh, INDIA. (unit-I)
2. **"The Complete Reference C":** Fourth Edition Herbert Schildt Osborne/McGraw-Hill.(Unit-2,3,4,5).

References:

1. "Programming in C", Pradip Dey, Manas Ghosh, Oxford Higher Education
2. "Programming in C and Data Structures", Hanly, Koffman, Kamthane, Ananda Rao, Pearson.
3. "Programming in C", Reema Thareja, Oxford Higher Education.
4. "Computer Fundamentals and C Programming", First Edition, Dr.P.Chenna Reddy, Available at: www.pothi.com.
5. "Data Structure and Program Design in C", Second Edition, Kruse, Tondo, Leung, Mogalla, Pearson.
6. "Programming with C", R.S. Bichkar, University Press.
7. "Computer Science A Structured Programming Approach Using C", Third Edition, Fourouzan & Gilberg, Cengage Learning
8. "Programming with C", Byron Gottfried, Third Edition, Schaum's Outlines, 3rd edition, 2010, Mc Graw Hill.

I B.Tech I Sem

R-15

15ABS01-ENGINEERING PHYSICS

(Common for EEE, ECE and CSE)

L	T	P	C
3	1	0	3

Objectives:

1. To evoke interest on applications of superposition effects like interference and diffraction, the mechanisms of emission of light, achieving amplification of electromagnetic radiation through stimulated emission, study of propagation of light through transparent dielectric waveguides along with engineering applications.
2. To enlighten the periodic arrangement of atoms in crystals, direction of Bragg planes, crystal structure determination by X-rays and non-destructive evaluation using ultrasonic techniques.
3. To get an insight into the microscopic meaning of conductivity , classical and quantum free electron model, the effect of periodic potential on electron motion, evolution of band theory to distinguish materials and to understand electron transport mechanism in solids.
4. To open new avenues of knowledge and understanding semiconductor based electronic devices , basic concepts and applications of semiconductors and magnetic materials have been introduced which find potential in the emerging micro device applications.
5. To give an impetus on the subtle mechanism of superconductors in terms of conduction of electron pairs using BCS theory, different properties exhibited by them and their fascinating applications. Considering the significance of microminiaturization of electronic devices and significance of low dimensional materials, the basic concepts of nanomaterials, their synthesis, properties and applications in emerging technologies are elicited.

UNIT 1: Physical Optics, Lasers And Fibre Optics

Physical Optics: Interference (Review) – Interference in thin film by reflection –Newton's rings –Diffraction (Review) - Fraunhofer diffraction due to single slit, double slit and diffraction grating.

Lasers: Characteristics of laser – Spontaneous and stimulated emission of radiation – Einstein's coefficients — Population inversion – Excitation mechanism and optical resonator – Nd:YAG laser - He-Ne laser – Semiconductor Diode laser - Applications of lasers

Fiber optics: Introduction - construction and working principle of optical fiber –Numerical aperture and acceptance angle – Types of optical fibers – Attenuation and losses in Optical fibers –Block diagram of Optical fiber communication system – Applications of optical fibers

UNIT 2: Crystallography And Ultrasonics

Crystallography: Introduction – Space lattice –Unit cell – Lattice parameters –Bravias lattice – Crystal systems – Packing fractions of SC, BCC and FCC - Directions and planes in crystals – Miller indices – Interplanar spacing in cubic crystals – X-ray diffraction - Bragg's law – Powder method.

Ultrasonics: Introduction – Production of ultrasonics by piezoelectric method – Properties and detection – Applications in non-destructive testing.

UNIT 3: Quantum Mechanics And Electron Theory

Quantum Mechanics: Matter waves – de'Broglie hypothesis and properties - Schrodinger's time independent wave equations – Physical significance of wave function - Particle in one dimensional infinite potential well.

Electron theory: Classical free electron theory – Equation for electrical conductivity - Quantum free electron theory – Fermi-Dirac distribution – Source of electrical resistance – Kronig-Penny model (qualitative treatment) – Origin of bands in solids – Classification of solids into conductors, semiconductors and insulators.

UNIT 4: Semiconductors And Magnetic Materials

Semiconductors: Intrinsic and extrinsic semiconductors (Qualitative treatment) – Drift & diffusion currents and Einstein's equation – Hall effect - Direct and indirect band gap semiconductors – Formation of p-n junction.

Magnetic materials: Introduction and basic definitions – Origin of magnetic moments – Bohr magnetron – Classification of magnetic materials into dia, para, ferro, antiferro and ferri magnetic materials (Qualitative treatment) – Hysteresis - Soft and hard magnetic materials, applications of magnetic materials.

UNIT 5: Superconductivity And Physics Of Nanomaterials

Superconductivity: Introduction - Effect of magnetic field - Meissner effect – Type I and Type II superconductors – Flux quantization – Penetration depth - BCS theory (qualitative treatment) — Josephson effects –Applications of superconductors.

Physics of Nanomaterials: Introduction - Significance of nanoscale and types of nanomaterials – Physical properties: optical, thermal, mechanical and magnetic properties – Synthesis of nanomaterials by Top down and bottom up approaches: ball mill, chemical vapour deposition, and sol gel –Applications of nanomaterials.

Text books:

1. Engineering Physics – K.Thyagarajan, 5th Edition, MacGraw Hill Publishers, NewDelhi, 2014.

2. Physics for Engineers - N.K Verma, 1st Edition, PHI Learning Private Limited, Delhi,2014.

Reference Books:

1. Engineering Physics – Dr. M.N. Avadhanulu & Dr. P.G. Kshirsagar, 10th Edition, S.Chand and Company, New Delhi, 2014.

2. Engineering Physics – D K Pandey, S. Chaturvedi, 2nd Edition, Cengage Learning, New Delhi, 2013.

3. Engineering Physics – D.K Bhattacharya, Poonam Tandon, 1nd Edition, Oxford University Press, New Delhi, 2015.

Outcomes:

- The different realms of physics and their applications in both scientific and technological systems are achieved through the study of physical optics, lasers and fibre optics.
- The important properties of crystals like the presence of long-range order and periodicity, structure determination using X-ray diffraction are focused along with defects in crystals and ultrasonic non-destructive techniques.
- The discrepancies between the classical estimates and laboratory observations of physical properties exhibited by materials would be lifted through the understanding of quantum picture of subatomic world.
- The electronic and magnetic properties of materials were successfully explained by free electron theory and the bases for the band theory are focused.
- The properties and device applications of semiconducting and magnetic materials are illustrated.
- The importance of superconducting materials and nanomaterials along with their engineering applications are well elucidated.

I B.Tech I Sem

15AME01-ENGINEERING DRAWING

(Common for EEE, ECE and CSE)

L	T	P	C
3	1	0	3

Course Objective:

- By studying the engineering drawing, a student becomes aware of how industry communicates technical information. Engineering drawing teaches the principles of accuracy and clarity in presenting the information necessary about objects.
- This course develops the engineering imagination i.e., so essential to a successful design, By learning techniques of engineering drawing changes the way one things about technical images.
- It is ideal to master the fundamentals of engineering drawing first and to later use these fundamentals for a particular application, such as computer aided drafting. Engineering Drawing is the language of engineers, by studying this course engineering and technology students will eventually be able to prepare drawings of various objects being used in technology.

UNIT I

Introduction to Engineering Drawing: Principles of Engineering Graphics and their Significance-Conventions in Drawing-Lettering - BIS Conventions. Curves used in Engineering Practice.

a) Conic Sections including the Rectangular Hyperbola- General method only,
b) Cycloid, Epicycloids and Hypocycloid
c) Involutes

UNIT II

Projection of Lines: Inclined to one or both planes, Problems on projections, Finding True lengths. **Projections of Planes**: Projections of regular plane surfaces/figures, Projection of lines and planes using auxiliary planes.

UNIT III

Projections of solids: Projections of regular solids inclined to one or both planes – Auxiliary Views. **Sections of Solids**: Section Planes and Sectional View of Right Regular Solids- Prism, cylinder, Pyramid and Cone. True shapes of the sections.

UNIT IV

Development of Surfaces: Development of Surfaces of Right Regular Solids-Prism, Cylinder, Pyramid, Cone and their Sectional Parts.

UNIT V

Isometric and Orthographic Projections: Principles of isometric projection- Isometric Scale-Isometric Views- Conventions- Isometric Views of lines, Planes Figures, Simple and Compound Solids-Conversion of isometric Projections/Views of Orthographic Views-Conventions.

Text Books:

1. Engineering Drawing, N.D. Bhat, Charotar Publishers
2. Engineering Drawing, K.L. Narayana& P. Kannaih, Scitech Publishers, Chennai

Reference Books:

1. Engineering Drawing, Johle, Tata McGraw-Hill Publishers
2. Engineering Drawing, Shah and Rana,2/e, Pearson Education
3. Engineering Drawing and Graphics, Venugopal/New age Publishers
4. Engineering Graphics, K.C. John, PHI,2013
5. Engineering Drawing, Basant Agarwal/ C.M.Agarwal

Suggestions:

1. Student is expected to buy a book mentioned under Text books " for better understanding.
2. Students can find the applications of various conics in engineering and application of involute on gear teeth. The innovation for drawing can be had on line from introduction to engineering drawing with tools-youtube http-sewor,Carleton.ca/-g,kardos/88403/drawings.html conic sections-online, red woods.edu

This subject also paves the way for learing Auto Cad, CAD / CAM, CATIA and Pro E which are advanced software packages needed for every mechanical engineer (To be taught & examined in First angle projection). The skill acquired by the student in this subject is very useful in conveying his ideas to the layman easily.

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I B.Tech I Sem

15AEC02-NETWORK ANALYSIS

L	T	P	C
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Course Objectives:

To help students develop an understanding on analyzing electrical circuits using various techniques. To make the student familiarize with the fundamental concepts of coupled circuits, resonance, filters and to analyze the transient response in electric circuits.

Course Outcomes:

Upon completion of the course, students will be able to:

a. To solve the electrical network using mesh and nodal analysis by applying network theorems.
b. Understand the basic concepts of coupled circuits, resonance and filters and solve problems.
c. Analyze transient response in AC and DC electric circuits.

UNIT-I

Introduction: The capacitance parameter, The inductance parameter , The resistance parameter, reference direction for current and voltage, active element convention , the dot convention for coupled circuits, Kirchhoff's laws, the number of network equation, source transformation, example of the formulation of network equation loop variables analysis, node variables analysis, duality, network. Dependent sources.

Network graph theory: concept of network graph , terminology used in network graph, relation between Twigs and Links, properties of tree in a graph, formation of incidence Matrix[Ai], number of trees in a graph, cut-set matrix, tie set matrix, fundamental tie-set matrix, fundamental of cut-set.

UNIT-II

Initial Conditions in Networks: Why Study Initial Conditions, Initial Conditions in Element, Geometrical Interpretation of Derivatives, A Procedure for Evaluating Initial Conditions, initial State of a Network.

Resonance: Introduction, Definition of 'quality factor Q' of inductor and capacitor, Series resonance, Bandwidth of the series resonant circuits, Parallel resonance (or anti-resonance), Conditions for maximum impedance, Currents in parallel resonance,

UNIT-III

Network theorems: Superposition and Reciprocating, Maximum power transfer theorem, Thevenin's Theorem, Norton's Theorem and Tellegen's theorem.

Network function: poles and zeros, terminal pairs or ports, network function for one port and two port, the calculation of network function: ladder network, general network, poles and zeros of network function

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UNIT- IV

Two port parameters: relation of two port variables, short circuit admittance parameters, the open circuit impedance parameters, Transmission parameters, the hybrid parameters, relation between parameter sets, parallel connection of two port network.

Input power, power transfer and insertion loss: energy and power, effective or root mean square values, average power and complex power, problem in optimizing power transfer, insertion loss.

UNIT- V

Filters: Introduction, the neper & decibel, Characteristic Impedance of symmetrical networks, Currents & voltage ratios as exponentials; the propagation constant, Hyperbolic trigonometry, Properties of symmetrical networks, Filter fundamentals; pass and stop bands, Behavior of characteristic impedance, The constant – k low pass filter, the constant – k high pass filter, The m-derived T section, The m-derived π section.

Text Books:

1. Engineering Circuit Analysis, William H Hayt Jr. Jack E Kemmerly, Steven Durbin, 8th edition, Tata McGraw-Hill, 2013.
2. Networks, Lines, and Fields, John D. Ryder, 2nd Edition, PHI publications, 2013.

References:

1. Network Analysis, Van Valkenburg, 3rd Edition, Pearson, 2006.
2. Network and Systems, D Roy Choudary, 1st Edition, New Age International, 2015.
3. Circuits & Network Analysis & Synthesis, A. Sudhakaar & Shyanmugam S.Palli, 2nd Edition, Tata McGraw Hill, 2006.
4. Network Analysis and synthesis, Franklin F. Kuo, 2nd Edition, Wiley India Pvt Ltd., 1962.

I B.Tech I Sem

15AHS02-ENGLISH LANGUAGE COMMUNICATION SKILLS LAB

(Common For All Branches)

L	T	P	C
0	0	3	2

The **Language Lab** focuses on the production and practice of sounds of language and familiarizes the students with the use of English in everyday situations and contexts.

Objectives:

- To enable students to learn better pronunciation through stress on word accent, intonation, and rhythm.
- To help the second language learners to acquire fluency in spoken English and neutralize mother tongue influence
- To train students to use language appropriately for interviews, group discussion and public speaking

Syllabus:

UNIT-I

1. Phonetics -importance
2. Introduction to Sounds of Speech
3. Vowels and consonants sounds
4. Phonetic Transcription

UNIT-II

5. Word Stress
6. Strong and weak forms
7. Sentence stress and Intonation

UNIT-III

8. Communication skills –process & barriers
9. Role Plays & JAM
10. Describing people/objects/places

UNIT-IV

11. Debates & Group Discussions
12. Speeches for Special Occasions
13. Group Discussions
14. Interview skills

UNIT-V

15. Writing video speeches
16. Book reviews -oral and written

Minimum Requirement For Elcs Lab:

The English Language Lab shall have two parts:

1. Computer Assisted Language Learning (CALL) Lab: The Computer aided Language Lab for 60 students with 60 systems, one master console, LAN facility and English language software for self- study by learners.
2. The Communication Skills Lab with movable chairs and audio-visual aids with a P.A. system, Projector, a digital stereo-audio & video system and camcorder etc.

   System Requirement (Hardware component):

   Computer network with Lan with minimum 60 multimedia systems with the following specifications:

   i) P – IV Processor
      a) Speed – 2.8 GHZ
      b) RAM – 512 MB Minimum
      c) Hard Disk – 80 GB

   ii) Headphones of High quality

Suggested Software:

1. Clarity Pronunciation Power – Part I (Sky Pronunciation)
2. Clarity Pronunciation Power – part II
3. K-Van Advanced Communication Skills
4. Walden InfoTech Software.

Reference Books:

1. Spring Board Success, Sharada Kouhik, Bindu Bajwa, Orient Blackswan, Hyderbad, 2010.
2. Technical English – Dr. M. Sambaiah- Wiley India Pvt. Ltd..NewDelhi. 2014.
3. A Textbook of English Phonetics for Indian Students 2nd Ed T. Balasubramanian. (Macmillian),2012.
4. A Course in Phonetics and Spoken English, Dhamija Sethi, Prentice-Hall of India Pvt.Ltd
5. Speaking English Effectively, 2nd Edition Krishna Mohan & NP Singh, 2011. (Mcmillan).
6. A Hand book for English Laboratories, E.Suresh Kumar, P.Sreehari, Foundation Books,2011

Expected Outcomes:

- Become active participants in the learning process and acquire proficiency in spoken English.

Speak with clarity and confidence thereby enhance employability skills.

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I B.Tech I Sem

15ACS02-COMPUTER PROGRAMMING LAB

(Common For All Branches)

L T P C
0 0 3 2

WEEK	LIST OF EXPERIMENTS
1	Practice DOS Commands necessary for design of C Programs.
2	Practice LINUX Commands necessary for design of C Programs.
3	Practice the Raptor Tool
4	a. Write a program to perform arithmetic operations. b. Write a program to exchange two numbers without using temporary variable c. Write a program to exchange two numbers with temporary variable d. Write a program to find the maximum of three numbers
5.	a. Write a program for s=ut+1/2at^2 b. Write a program to find area of square, circle and rectangle. c. Write a program to find the maximum of two numbers using ternary operator. d. Write a program for sum of first N natural numbers.
6	a. Write a program to compute the factorial of a given number. b. Write a program to check whether the number is prime or not. c. Write a program to check for number palindrome. d. Write a program to generate Fibonacci numbers in the given range.
7	a. Write a program to find the sum of the digits of a number. b. Write a program to find the sum of positive and negative numbers in a given set of numbers. c. Write a program to perform the operations addition, subtraction, multiplication of complex numbers. d. Write a program to find the sum of first and last digit numbers in a given number.
8	a. Write a program to read two matrices and print their sum and product in the matrix form. b. Write a program to find the maximum of a set of numbers. c. Write a program to read matrix and perform the following operations. a. Find the sum of Diagonal Elements of a matrix. b. Print Transpose of a matrix. c. Print sum of even and odd numbers in a given matrix.
9	a. Write a program to accept a line of characters and print the count of the number of Vowels, Consonants, blank spaces, digits and special characters. b. Write a program to insert a substring in to a given string and delete few characters from the string. Don't use library functions related to strings. c. Write a program to read two strings and perform the following operations without using built-in string Library functions and by using your own implementations of functions. i. String length determination ii .Compare Two Strings iii. Concatenate them, if they are not equal iv. String reversing
10	a. Write programs using recursion for Factorial of a number, GCD, LCM, Towers of Hanoi. b. Write a program for tic-tac-toe game. c. Write a program to implement numerical methods Lagrange's interpolation, Trapezoidal rule.

11	a. Write a program to exchange two numbers using pointers. b. Write a program to calculate the length of string using pointers. c. Write a program to using pointers to read in an array of integers and print its elements in reverse order. d. Write a program to generate pseudo random generator.
12	a. Write a program to evaluate the sum of the following series up to 'n' terms $e^x=1+x+x^2/2!+x^3/3!+x^4/4!+$-------- b. Write a program that prints a triangle of stars. Print 1 star in row 0, 3 stars in row 1, 5 stars in row 2, and so on. Here is what this looks like: For the non-star characters, use dot or space. ....*........... ....***.......... ....*****......... ....*******........ ....*********....... c. Write a program to read student records into a file. Record consists of rollno, name and marks of a student in six subjects and class. Class field is empty initially. Compute the class of a student. The calculation of the class is as per JNTUA rules. Write the first class, second class, third class and failed students lists separately to another file.
13	a. Write a program to read last n characters of the file using appropriate file function. b. Write a program to copy the contents one of one file into another file using fgetc and fputc functions. c. A file consists of information about employee salary with fields employee id, name, Basic, HRA, DA, IT, other-deductions, Gross and Net salary. Initially only employee id, name, and basic have valid values. HRA is taken as 10% of the basic, DA is taken as 80% of basic, IT is 20% of the basic, other deductions is user specified. Compute the Gross and Net salary of the employee and update the file.
14	a. Write a program to perform Base (decimal, octal, hexadecimal, etc) conversion b. Write a program to read a set of strings and sort them in alphabetical order. c. Write a program to Convert Decimal to Hexa Decimal? d. Write a program to Convert Binary to Decimal? e. **Write a Program to Add two numbers using Command Line Arguments.**

NEW PROGRAMS:

1. Write a program to implement magic square.
2. Write a program to print 50 students details using structures.
3. Write a program to create one structure and declare it inside union then accept values for structure members and display them.
4. Write a program to find the speed of ordinary, express, super luxury buses based on their distance and time.
5. Write c Program to accept N integer numbers and store even and odd integers in separate arrays.
6. Write a c program to input real numbers and find the mean, variance and standard deviation.

I B.Tech I Sem

15ABS02-ENGINEERING PHYSICS LABORATORY

(Common for EEE, ECE and CSE)

L	T	P	C
0	0	3	2

Lab Objective:

- Will recognize the important of optical phenomenon like Interference and diffraction.
- Will understand the role of optical fiber parameters and signal losses in communication.
- Will recognize the importance of energy gap in the study of conductivity and hall effect in a semiconductor
- Will understand the applications of B H curve.
- Will acquire a practical knowledge of studying the crystal structure in terms of lattice constant.
- Will recognize the application of laser in finding the particle size and its role in diffraction studies.
- Will learn to synthesis of the nano materials and recognize its importance by knowing its nano particle size and its impact on its properties.

Any 10 of the following experiments has to be performed

1. Determination of radius of curvature of a Plano-convex lens by forming Newton's rings.
2. Determination of wavelength of given source using diffraction grating in normal incidence method.
3. Determination of Numerical aperture, acceptance angle of an optical fiber.
4. Energy gap of a Semiconductor diode.
5. Hall effect – Determination of mobility of charge carriers.
6. B-H curve – Determination of hysteresis loss for a given magnetic material.
7. Determination of Crystallite size using X-ray pattern (powder) using debye-scheerer method.
8. Determination of particle size by using laser source.
9. Determination of dispersive power of a prism.
10. Determination of thickness of the thin wire using wedge Method.
11. Laser : Diffraction due to single slit
12. Laser : Diffraction due to double slit
13. Laser: Determination of wavelength using diffraction grating
14. Magnetic field along the axis of a current carrying coil – Stewart and Gee's method.
15. Synthesis of nanomaterial by any suitable method.

Reference:

1. Engineering Physics Practicals – NU Age Publishing House, Hyderabad.
2. Engineering Practical physics – Cengage Learning, Delhi.

Lab Outcomes:

- Would recognize the important of optical phenomenon like Interference and diffraction.
- Would have acquired the practical application knowledge of optical fiber, semiconductor, dieclectric and magnetic materials, crystal structure and lasers by the study of their relative parameters.
- Would recognize the significant importance of nanomaterials in various engineering fields.

I B.Tech II Sem

15AHS03-ENGLISH FOR PROFESSIONAL COMMUNICATION

(Common for all Branches)

L	T	P	C
3	1	0	3

1. Introduction:

English is a global language and has international appeal and application. It is widely used in a variety of contexts and for varied purposes. The students would find it useful both for social and professional development. There is every need to help the students acquire skills useful to them in their career as well as workplace. They need to write a variety of documents and letters now extending into professional domain that cuts across business and research also. The syllabus has been designed to enhance communication skills of the students of engineering and pharmacy. The prescribed books serve the purpose of preparing them for everyday communication and to face the global competitions in future.

The texts prescribed for detailed study focus on LSRW skills and vocabulary development. The teachers should encourage the students to use the target language. The classes should be interactive and learner-centered. They should be encouraged to participate in the classroom activities keenly.

In addition to the exercises from the text done in the class, the teacher can bring variety by using authentic materials such as newspaper articles, advertisements, promotional material etc.

2. Objectives:

1. To develop confidence in the students to use English in everyday situations.
2. To enable the students to read different discourses so that they appreciate English for science and technologies.
3. To improve familiarity with a variety of technical writings.
4. To enable the students to acquire structure and written expressions required for their profession.
5. To develop the listening skills of the students.

3. Syllabus:

UNIT –I

Reading : Lawley Road — R.K. Narayan
Writing: Emails - Application letters and curricula vitae
Listening: Listening for information
Functional English: Agreeing and disagreeing - Suggesting and advising
Grammar: Types Of sentences
Vocabulary: Compound words -Collocations
Non Detailed Study : Problem-Solving Skills

UNIT-II

Reading: Environmental Consciousness- Solution to Plastic Pollution-Soma Basu
Writing: Technical Note making -Memorandums – agenda-Official reports
Listening: Listening for facts

Functional English: Giving instructions - Asking for clarifications and permission
Grammar: Question tags
Vocabulary: Prepositions
Non Detailed Study: Interview Skills

UNIT-III

Reading: The Man Behind 'i'
Writing: Summaries –
Listening: Listening for the gist –
Functional English: Telephone skills
Grammar: Adjectives
Vocabulary: Conjunctions
Non Detailed Study: Adaptability Skills

UNIT-IV

Reading: The Bet — Anton Chekhov
Writing: Technical documentation-Concise writing-Paraphrases –
Listening: Listening for opinions -Presentations
Functional English: Individual Presentations
Grammar: Subject-verb agreement
Vocabulary: Phrasal verbs- Idioms.
Non Detailed Study: Non-Verbal Communication Skills

UNIT-V

Reading: The Gift of the Magi — O. Henry
Writing: Information transfer
Listening: Listening for opinions
Functional English: Group Presentations
Grammar: Active and passive voice
Vocabulary: Commonly confused words- One-word substitutes
Non Detailed Study: Written Communication Skills

Text books:

Detailed text: **English for Fluency** , K Purushottam,Orient Black Swan,2013.
Non detailed text: **English and soft skills,** S P Danavel, Orient Black Swan 2013Edition.

References:

1. **Mindscapes**, English For Technologists and Engineers, Orient Black Swan,2012.
2. **Effective Technical Communication,** Rizvi,Tata McGraw-Hill Education, 2007.
3. **Technical Communication,** Meenakshi Raman, Oxford University Press.2011.
4. **English Conversations Practice,** Grant Taylor, Tata Mc GrawHill publications,2013.
5. **Practical English Grammar.** Thomson and Martinet, OUP, 2010.

Expected Outcomes:

At the end of the course, students would be expected to:
1. Have acquired ability to participate effectively in group discussions.
2. Have developed ability in writing in various contexts.
3. Have acquired a proper level of competence for employability.

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I B.Tech II Sem

15ABS07-MATHEMATICS – II

(Common for all Branches)

L	T	P	C
3	1	0	3

Objectives: Our emphasis will be more on conceptual understanding and applications of Fourier series, Laplace transforms, Fourier transforms, Z transforms and solutions of partial differential equations.

UNIT – I

Laplace transform of standard functions – Inverse transform – First shifting Theorem, Transforms of derivatives and integrals – Unit step function – Second shifting theorem – Dirac's delta function – Convolution theorem – Laplace transform of Periodic function.

Differentiation and integration of Laplace transforms – Applications of Laplace transform to ordinary differential equations of first and second order.

UNIT – II

Fourier Series: Determination of Fourier coefficients – Fourier series – Even and odd functions – Fourier series in an arbitrary interval – Even and odd periodic continuation – Half-range Fourier sine and cosine expansions- Parseval's formula- Complex form of Fourier series.

UNIT – III

Fourier integral theorem (only statement) – Fourier sine and cosine integrals. Fourier transform – Fourier sine and cosine transforms – Properties – Inverse transforms – Finite Fourier transforms.

UNIT – IV

Formation of partial differential equations by elimination of arbitrary constants and arbitrary functions – Method of separation of variables – Solutions of one dimensional wave equation, heat equation and two-dimensional Laplace's equation under initial and boundary conditions.

UNIT – V

z-transform – Inverse z-transform – Properties – Damping rule – Shifting rule – Initial and final value theorems. Convolution theorem – Solution of difference equations by z-transforms.

Text Books:

1. Higher Engineering Mathematics, B.S.Grewal, Khanna publishers.
2. Higher Engineering Mathematics, by B.V.Ramana, Mc Graw Hill publishers.

References:

1. Advanced Engineering Mathematics, by Erwin Kreyszig, Wiley India.
2. Mathematical Methods by T.K.V. Iyengar, B.Krishna Gandhi, S.Ranganatham and M.V.S.S.N.Prasad S. Chand publication.
3. Engineering Mathematics, Volume - II, E. Rukmangadachari, Pearson Publishers.

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Outcomes:

At the end of the course, the student will be able to attain the abilities to use mathematical knowledge to analyze, formulate and solve problems in engineering applications, using discrete and continuous transforms and partial differential equations.

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I B.Tech II Sem

15ABS03-ENGINEERING CHEMISTRY

(Common for EEE, ECE and CSE)

L	T	P	C
3	1	0	3

Course Objectives :

- The Engineering Chemistry course for undergraduate students is framed to strengthen the fundamentals of chemistry and then build an interface of theoretical concepts with their industrial/engineering applications.
- The course main aim is to impart in-depth knowledge of the subject and highlight the role of chemistry in the field of engineering.
- The lucid explanation of the topics will help students understand the fundamental concepts and apply them to design engineering materials and solve problems related to them. An attempt has been made to logically correlate the topic with its application.
- The extension of fundamentals of electrochemistry to energy storage devices such as commercial batteries and fuel cells is one such example.
- After the completion of the course, the student would understand about the concepts of chemistry in respect of Electrochemical cells, fuel cells, mechanism of corrosion and factors to influence, polymers with their applications, engineering materials and water chemistry.

UNIT.1: Water Treatment

Impurities in water, Hardness of water and its Units, Disadvantages of hard water, Estimation of hardness by EDTA method, Numerical problems on hardness, Estimation of dissolved oxygen, Alkalinity, acidity and chlorides in water, Water treatment for domestic purpose (Chlorination, Bleaching, ozonisation, U.V. treatment)

Industrial Use of water:

For steam generation, troubles of Boilers: Scale & Sludge, Priming and Foaming, Caustic Embrittlement and Boiler Corrosion.

Treatment of Boiler Feed water:

Internal Treatment: Colloidal, Phosphate, Carbonate, Calgon and sodium aluminate treatment.

External Treatment: Ion-Exchange and Permutit processes.

Demineralisation of brackish water: Reverse Osmosis and Electrodialysis

UNIT.2: Electrochemistry

i).Review of electrochemical cells, Numerical calculations, Batteries: Rechargeable batteries (Lead acid, Ni-Cd, Lithium Ion Batteries),Fuels cells: (Hydrogen-Oxygen and Methanol-Oxygen)

ii). Voltammetry: Basic Principles and applications (Ferrous/Ferric System)

Electrochemical sensors: Potentiometric Sensors and voltammetric sensors. Examples : analysis of Glucose and urea

iii).Corrosion: Electrochemical Theory of corrosion, Factors affecting the corrosion. Prevention: Anodic and cathodic protection and electro and electroless plating.

UNIT.3: Polymers

i). Introduction: Basic concepts of polymerisation, Types of poloymerisation (Chain Growth (Addition), Step growth (Condensation)), Mechanism: cationic, anionic, free radical and coordination covalent, Polydispercity Index.

Plastomers: Thermosetting and Thermoplatics, Preparation, properties and Engineering applications , PVC, Bakelite, nylons, Polyester Elastomers (rubbers) Natural Rubber; Processing of natural rubber, Compounding of Rubber Synthetic Rubber: Preparation, properties and engineering applications of Buna-S, buna-N, Polyurethene, Polysulfide (Thiokol) rubbers
ii).Conducting polymers: Mechanism, synthesis and applications of polyacetyline, polyaniline.
iii).Liquid Crystals: Introduction, classification and applications
iv).Inorganic Polymers: Introduction, Silicones, Polyphospazins (-(R)2-P=N-), applications

UNIT.4: Fuel Technology
Classifications of Fuels – Characteristics of Fuels- Calorific Value – Units, Numerical Problems.
i). Solid Fuels–Coal, Coke : Manufacture of Metallurgical Coke by Otto Hoffmann's by product oven processes.
ii).Liquid Fuels:
Petroleum: Refining of Petroleum, Gasoline: Octane Number, Synthetic Petrol: Bergius Processes, Fischer Troph's synthesis
Power Alcohol: Manufacture, merits and demerits of Power Alcohol
iii). Gaseous Fuels: Origin, Production and uses of Natural gas, Producer gas, Water gas, Coal gas and Biogas. Flue Gas analysis by Orsat's apparatus, Solving of problems on Combustion.
iv). Bio Fuels: Biogas, Biodiesel and their significance

UNIT.V: Chemistry Of Engineering Materials
i).Semiconducting and Superconducting materials-Principles and some examples
ii).Magnetic materials – Principles and some examples
iii).Cement: Composition, Setting and Hardening (Hydration and Hydrolysis)
iv).Refractories: Classification , properties and applications
v).Lubricants: Classification and characteristics of lubricants, Theory of lubrication.

Expected Outcomes (EO): The student is expected to:

- Understand the electrochemical sources of energy
- Understand industrially based polymers, various engineering materials.
- Differentiate between hard and soft water. Understand the disadvantages of using hard water domestically and industrially. Select and apply suitable treatments domestically and industrially.

Text Books:

1. Engineering Chemistry by KNJayaveera, GVSubba Reddy and C. Ramachandraiah, McGraw Hill Higher Education, New Delhi, Foruth Edition, 2013.
2. A Text Book of Engineering Chemistry, Jain and Jain, Dhanapath Rai Publishing Company, New Delhi, 15th Edition, 2012.

References:

1. A Text book of Engineering Chemistry by S.S Dhara, S.S.Umare, S. Chand Publications, New Delhi, 12th Edition, 2010.
1. Engineering Chemistry, K. Sesha Maheswaramma and Mrudula Chugh, Pearson Education, First Edition, 2013.
2. Engineering Chemistry by K.B.Chandra Sekhar, UN.Das and Sujatha Mishra,
3. SCITECH, Publications India Pvt Limited, Chennai, 2nd Edition, 2012.
4. Concepts of Engineering Chemistry- Ashima Srivastavaf and N.N. Janhavi, Acme

I B.Tech II Sem

15ABS05-ENVIRONMENTAL STUDIES
(Common for EEE, ECE and CSE)

L	T	P	C
3	1	0	3

Objectives

- To investigate the relationship between human life and environment from scientific prospective
- To help you apply the fundamentals of Environmental science to important local, regional, national and global environmental problems and potential issues

UNIT-I:

i) **Multidisciplinary** nature of environmental studies

The **Multidisciplinary** nature of environmental studies Definition; Scope and importance, Need for public awareness.

ii) **Natural Resources:**

Renewable and non-renewable resources: Natural resources and associated problems.

a) Forest resources: Use and Over-exploitation, deforestation, case studies. Timber extraction, mining, dams and their effects on forests and tribal people.

b) Water resources: Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams benefits and problems.

c) Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies.

d) Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies.

e) Energy resources: Growing energy needs, renewable and non-renewable energy sources, use of alternate energy sources, Case studies.

f) Land resources: Land as a resource, land degradation, man induced landslides, soil erosion and desertification.

- Role of an individual in conservation of natural resources.
- Equitable use of resources for sustainable lifestyles.

UNIT-II:

i) **Ecosystems**

Concept of an ecosystem, Structure and function of an ecosystem, Producers, consumers and decomposers. Energy flow in the ecosystem, Ecological succession. Food chains, food webs and ecological pyramids.

Introduction, types, characteristic features, structure and function of the following ecosystem: -

a. Forest ecosystem b. Grassland ecosystem c. Desert ecosystem

d. Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries).

ii) Biodiversity and its Conservation

Introduction-Definition: genetic, species and ecosystem diversity. Biogeographical classification of India. Value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values. Biodiversity at global, National and local levels. India as a mega-diversity nation. Hot-spots of biodiversity. Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts. Endangered and endemic species of India. Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity.

UNIT-III:

Environmental Pollution:

Definition - Causes, effects and control measures of: -

a. Air pollution b. Water pollution c. Soil pollution d. Marine pollution
e. Noise pollution f. Thermal pollution g. Nuclear hazards

Solid waste Management: Causes, effects and control measures of urban and industrial wastes. Role of an individual in prevention of pollution. Pollution case studies. Disaster management: floods, earthquake, cyclone and landslides.

UNIT-IV:

Social Issues and the Environment

From Unsustainable to Sustainable development. Urban problems related to energy.
Water conservation, rain water harvesting, watershed management.
Resettlement and rehabilitation of people; its problems and concerns. Case studies. Environmental ethics: Issues and possible solutions. Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust. Case studies. Wasteland reclamation. Environment Protection Act. Air (Prevention and Control of Pollution) Act. Water (Prevention and Control of Pollution) Act. Wildlife Protection Act. Forest Conservation Act.
Issues involved in enforcement of environmental legislation. Public awareness.

UNIT-V:

i) Human Population and the Environment

Population growth, variation among nations. Population explosion-Family welfare Programme. Environment and human health. Human Rights. Value Education. HIV/AIDS. - Women and Child Welfare. Role of information Technology in Environment and human health.
- Case Studies.

ii) Field Work

- Visit to a local area to document environmental assets-river/forest/grassland/ hill/mountain.
- Visit to a local polluted site-Urban/Rural/Industrial/Agricultural.
- Study of common plants, insects, birds.
- Study of simple ecosystems-pond, river, hill slopes, etc.

Expected Outcome:

- **Describe the structure and function of significant environmental systems**
- **Use scientific reasoning to identify and understand environmental problems and evaluate potential solutions**
- **Critically evaluate arguments regarding environmental issues**

Text Books:

1. Shashi Chawla, A Text Book of Environmental Studies, Mc Graw Hill Education, 4th edtion, 2014
2. De A.K., Environmental Chemistry, Wiley Eastern Ltd , 2012

Reference Books

1. Bharucha Erach, The Biodiversity of India, Mapin Publishing Pvt. Ltd., Ahmedabad -380013, India, Email: mapin@icenet. net (R).
2. Brunner R.C., 1989, Hazardous Waste Incineration, McGraw Hill Inc. 480p.
3. Cunningham, W.P.Cooper, T.H. Gorhani, E & Hepworth, M.T.2001, Environmental Encyclopedia, Jaico Publ. House, Mumbai, 1196p.

R-15

I YEAR II SEM

15ACS04-DATA STRUCTURES
(Common for ME, ECE and CSE)

L	T	P	C
3	1	0	3

UNIT-I

Stacks & Queues: stacks, stacks using dynamic arrays, Queues, circular queues using dynamic arrays, amazing problem, evaluation of expressions.

Linked List: single linked list and chains, representing chains in C, Linked stacks and queues, polynomials, additional list operations, equivalence classes, sparse matrices, double linked list.

UNIT –II

Trees : Introduction, Binary tree, Binary tree traversals , Additional binary tree operations, Threaded binary trees, Heaps, Binary search trees, Selection trees, Forests, Representation of disjoint sets, Counting binary trees.

UNIT-III

Graphs: The graph abstract data type, Elementary graph operations, Minimam cost spanning trees, Shortest paths and transitive closure.

Sorting: Motivation, Insertion sort, Quick sort, Merge sort , Heap sort, sorting on several keys, list and table sorts, external sorting.

UNIT –IV

Hashing: Introduction, Static hashing, dynamic hashing, Bloom Filters.

Priority Queues: Single ended and double ended priority queues, leftist trees, Binominal Heaps, Fibonacci Heaps, Pairing Heaps, Symmetric Min-Max Heaps, and Interval Heaps.

UNIT-V

Efficient binary search trees: Optimal binary search trees, AVL Trees, RED Black Trees, Splay Trees, M- Way search trees, B-Trees, B+ -Trees.

Text Books:

1. Fundamentals of Data structures in C, 2nd edition, HOROWITZ, SAHNI, ANDERSON-FREED.

I B.Tech II Sem

15AEC01-ELECTRONIC DEVICES AND CIRCUITS

L	T	P	C
3	1	0	3

Course Objectives: To give understanding on semiconductor physics of the intrinsic, p and n materials, characteristics of the p-n junction diode, diode's application in electronic circuits, Characteristics of BJT,FET,MOSFET, characteristics of special purpose electronic devices. To familiarize students with dc biasing circuits of BJT, FET and analyzing basic transistor amplifier circuits.

Course Outcomes:

Upon completion of the course, students will:

a. Analyze the operating principles of major electronic devices, its characteristics and applications.
b. Design and analyze the DC bias circuitry of BJT and FET.
c. Design and analyze basic transistor amplifier circuits using BJT and FET.

UNIT-I

Semiconductors: Intrinsic and extrinsic semiconductors, mobility and conductivity, Fermi level and carrier concentration of semi conductors, Drift and diffusion currents, continuity equation, Hall Effect.

PN junction diode: Band structure of PN Junction, Quantitative Theory of PN Diode, Volt – Amp Characteristics, Temperature Dependence, Transition and Diffusion Capacitance of PN Junction, Illustrative problems.

UNIT-II

Rectifiers: Half-wave, Full-wave and Bridge Rectifiers with and without Filters, Ripple Factor and Regulation Characteristics.

Special Diodes: Zener and Avalanche Breakdowns, Tunnel Diode, LED, Schottky Barrier Diode, Varactor Diode, Photo Diode, SCR.

UNIT-III

Bipolar Junction Transistors: Transistor construction, BJT Operation, Transistor as an Amplifier, Common Emitter, Common Base and Common Collector Configurations, Limits of Operation, BJT Specifications.

Junction Field Effect Transistor (JFET): The Junction Field Effect Transistor (Construction, Principle of Operation) - Pinch-Off Voltage – Volt-Ampere Characteristics, FET as Voltage Variable Resistor, Comparison between BJT and FET, MOSFET- Basic Concepts, Construction, modes (depletion & enhancement), symbol, principle of operation, characteristics.

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UNIT-IV

BIASING AND STABILISATION: Operating Point, DC and AC Load Lines, Importance of Biasing, Fixed Bias, Collector to Base Bias, Self Bias, Bias Stability, Stabilization against Variations in I_{CO} V_{BE} and β, Bias Compensation Using Diodes and Transistors, Thermal Runaway, Condition for Thermal Stability in CE configuration, Illustrative problems.

UNIT- V

SMALL SIGNAL ANALYSIS OF AMPLIFIERS: BJT Modeling using h-parameters, Determination of h-Parameters from Transistor Characteristics, Measurement of h-Parameters, Analysis of CE, CB and CC configurations using h-Parameters, Comparison of CB, CE and CC configurations, Simplified Hybrid Model, Illustrative problems.

Text Books:

1. Electronics Devices and Circuits, J.Millman and Christos. C. Halkias, 3rd edition, Tata McGraw Hill, 2006.
2. Electronics Devices and Circuits Theory, David A. Bell, 5th Edition, Oxford University press., 2008.

References:

1. Electronics Devices and Circuits Theory, R.L.Boylestad,Lousis Nashelsky and K.Lal Kishore, 12th edition, 2006, Pearson, 2006.
2. Electronic Devices and Circuits, K. Lal Kishore, 3rd Edition, BSP, 2008.
3. Electronic Devices and Circuits, N.Salivahanan, and N.Suresh Kumar, 3rd Edition, TMH, 2012
4. Microelectronic Circuits, S.Sedra and K.C.Smith, 5th Edition, Oxford University Press.

I B.Tech II Sem

15ACS05-DATA STRUCTURES LAB

L	**T**	**P**	**C**
0	**0**	**3**	**2**

1. Write a C Program to implement Stack ADT Using arrays and linked lists?
2. Write a C Program to implement Queue ADT Using arrays and linked lists?
3. Write a c Program to convert infix expression to postfix expression?
4. Write a C Program to implement List ADT?
5. Write a C Program to implement Sparse Matrices?
6. Write a C Program to traverse Binary tree?
7. Write a C Program to implement priority queues using arrays?
8. Write a C++ program to implement the search algorithms of the graph: Depth first search and Breadth first search.
9. Write a C program to find the connected components of the graph.
10. Write a C program to implement the spanning tree algorithms Kruskal's, Prim's.
11. Write a C program to implement insertion sort algorithm
12. Write a C program to implement quick sort algorithm
13. Write a C program to implement merge sort algorithm
14. Write a C program to implement heap sort algorithm
15. Write a C Program to implement Static Hashing.
16. Write a C Program to implement Dynamic Hashing
17. Write a C Program to implement AVL Trees.
18. Write a C Program to implement RED Black Trees.
19. Write a C Program to implement Splay Trees.

Text Books:

1. Fundamentals of Data structures in C 2nd edition HOROWITZ , SAHNI, ANDERSON-FREED.

R-15

I B.Tech II Sem

15ABS04-ENGINEERING CHEMISTRY LAB

(Common for EEE, ECE and CSE)

L	T	P	C
0	0	3	2

Programme Objective:

- Will learn practical understanding of the redox reaction
- Will able to understand the function of fuel cells, batteries and extend the knowledge to the processes of corrosion and its prevention
- Will learn the preparation and properties of synthetic polymers and other material that would provide sufficient impetus to engineer these to suit diverse applications
- Will also learn the hygiene aspects of water would be in a position to design methods to produce potable water using modern technology

List Of Experiments

1. Determination of total hardness of water by EDTA method.
2. Determination of Copper by EDTA method.
3. Estimation of Dissolved Oxygen by Winkler's method
4. Determination of Manganese by colorimetry.
5. Estimation of iron (II) using diphenylamine indicator (Dichrometry – Internal indicator method).
6. Determination of Alkalinity of Water
7. Determination of acidity of Water
8. Preparation of Phenol-Formaldehyde (Bakelite)
9. Determination of Viscosity of oils using Redwood Viscometer I
10. Determination of Viscosity of oils using Redwood Viscometer II
11. Conductometric titration of strong acid Vs strong base (Neutralization titration).
12. Determination of Corrosion rate and inhibition efficiency of an inhibitor for mild steel in hydrochloric acid medium.
13. Estimation of Chloride ion using potassium Chromate indicator (Mohrs method)
14. Acid-Base neutralisation by pH method.

(Any 10 experiments from the above list)

Course Outcomes

- Would be confident in handling energy storage systems and would be able combat chemical corrosion
- Would have acquired the practical skill to handle the analytical methods with confidence.
- Would feel comfortable to think of design materials with the requisite properties
- Would be in a position to technically address the water related problems.

Text Books:

1. Vogel's Text book of Quantitative Chemical Analysis, J. Mendham et al, Pearson Education, Sixth Edition, 2012.
2. Chemistry Practical – Lab Manual by K.B.Chandra Sekhar, G.V. Subba Reddy and K.N.Jayaveera, SM Publications, Hyderabad, 3rd Edition, 2012.

I B.Tech II Sem

15AME03-ENGINEERING AND IT WORKSHOP

(Common for all Branches)

L	T	P	C
0	0	3	2

PART A: ENGINEERING WORKSHOP

Course Objective:

- The objective of this Lab is to provide the basic concepts about different manufacturing processes, use of various workshops tools and exposer to the power tools.
- Identify and use marking out tools, hand tools, measuring equipment and to work to prescribed tolerances.

Trades For Exercises:

At least 2 exercise in each:

1. Carpentry
2. Fitting
3. House-wiring
4. Foundry
5. Tin smithy
6. Welding.

Text Book:

1. Work shop Manual / P.Kannaiah/ K.L.Narayana/Scitech Publishers.
2. Workshop practice manual by K.Venkata Reddy B.S Publications

Codes / Tables : will be provided

Question Paper pattern : Test in any two trades out of 6 trades.

Course outcomes

- Workshop practice is the backbone of the real industrial environment which helps to develop and enhance relevant technical hand skills required by the technician working in the various engineering industries and workshops.
- This course intends to impart basic know-how of various hand tools and their use in different sections of manufacturing.
- Irrespective of branch, the use of workshop practices in day to day industrial as well domestic life helps to dissolve the problems.
- Workshop curricula build the hands on experiences which would help to learn manufacturing processes and production technology courses in successive semesters.

Workshop practice is also important since only practice can make the man perfect.

Head
Mechanical Engineering Department,
JNTUA College of Engineering,
PULIVENDULA - 516 390.

I B.Tech II Sem

15AME03-ENGINEERING AND IT WORKSHOP

(Common for all Branches)

L	T	P	C
0	0	3	2

PART B: IT Workshop

Course Objectives:

- To provide Technical training to the students on Productivity tools like Word processors, Spreadsheets, Presentations
- To make the students know about the internal parts of a computer, assembling a computer from the parts, preparing a computer for use by installing the operating system
- To learn about Networking of computers and use Internet facility for Browsing and Searching

Course Outcomes:

- Disassemble and Assemble a Personal Computer and prepare the computer ready to use
- Prepare the Documents using Word processors
- Prepare Slide presentations using the presentation tool
- Interconnect two or more computers for information sharing
- Access the Internet and Browse it to obtain the required information
- Install single or dual operating systems on computer

Preparing your Computer (2 weeks)

Task 1: Learn about Computer: Identify the internal parts of a computer, and its peripherals. Represent the same in the form of diagrams including Block diagram of a computer. Write specifications for each part of a computer including peripherals and specification of Desktop computer. Submit it in the form of a report.

Task 2: Assembling a Computer: Disassemble and assemble the PC back to working condition. Students should be able to trouble shoot the computer and identify working and non-working parts. Student should identify the problem correctly by various methods available (eg: beeps). Students should record the process of assembling and trouble shooting a computer.

Task 3: Install Operating system: Student should install Linux on the computer. Student may install another operating system (including proprietary software) and make the system dual boot or multi boot. Students should record the entire installation process.

Task 4: Productivity tools (6 weeks)

Word Processor: Students should be able to create documents using the word processor tool. Some of the tasks that are to be performed are inserting and deleting the characters, words and lines, Alignment of the lines, Inserting header and Footer, changing the font, changing the colour, including images and tables in the word file, making page setup, copy and paste block of text, images, tables, linking the images which are present in other directory, formatting paragraphs, spell checking, etc. Students should be able to prepare project cover pages, content sheet and chapter pages at the end of the task using the features studied. Students should submit a user manual of the word processor considered.

Task 5: Spreadsheet: Students should be able to create, open, save the application documents and format them as per the requirement. Some of the tasks that may be practiced are Managing the worksheet environment, creating cell data, inserting and deleting cell data, format cells, adjust the cell size, applying formulas and functions, preparing charts, sorting cells. Students should submit a user manual of the Spreadsheet application considered.

Task 6: Presentations : creating, opening, saving and running the presentations, Selecting the style for slides, formatting the slides with different fonts, colours, creating charts and tables, inserting and deleting text, graphics and animations, bulleting and numbering, hyperlinking, running the slide show, setting the timing for slide show. Students should submit a user manual of the Presentation tool considered.

Task 7:ACCESS:

Optional Tasks:

Task 7: Laboratory Equipment: Students may submit a report on specifications of various equipment that may be used by them for the laboratories in their curriculum starting from I B.tech to IV. B.Tech. It can vary from department to department. Students can refer to their syllabus books, consult staff members of the concerned department or refer websites. The following is a sample list. Instructors may make modifications to the list to suit the department concerned.

- Desktop computer
- Server computer
- Switch (computer science related)
- Microprocessor kit
- Micro controller kit
- Lathe machine
- Generators
- Construction material
- Air conditioner
- UPS and Inverter
- RO system
- Electrical Rectifier
- CRO
- Function Generator
- Microwave benches

References:

1. "Introduction to Computers", Peter Norton, Mc Graw Hill
2. "LaTeX Companion" – Leslie Lamport, PHI/Pearson.
3. "MOS study guide for word, Excel, Powerpoint & Outlook Exams", Joan Lambert, Joyce Cox, PHI.

4. "Introduction to Information Technology", ITL Education Solutions limited, Pearson Education.
5. "Networking your computers and devices", Rusen, PHI
6. "Trouble shooting, Maintaining & Repairing PCs", Bigelows, TMH.

II B.Tech I Sem

15ABS08-MATHEMATICS-III

(Common for all Branches)

L	T	P	C
3	1	0	3

Objectives:

- This course aims at providing the student with the concepts and applications of Matrices, Numerical Techniques and Curve fitting.

UNIT – I

Elementary row transformations-Rank – Echelon form, normal form – Consistency of System of Linear equations. Linear transformations. Hermitian, Skew-Hermitian and Unitary matrices and their properties. Eigen Values, Eigen vectors for both real and complex matrices. Cayley – Hamilton Theorem and its applications – Diagonolization of matrix. Calculation of powers of matrix and inverse of a matrix. Quadratic forms – Reduction of quadratic form to canonical form and their nature.

UNIT – II

Solution of Algebraic and Transcendental Equations: The Bisection Method – The Method of False Position– Newton-Raphson Method, Solution of linear simultaneous equation: Crout's triangularisation method, Gauss - Seidal iteration method.

UNIT – III

Interpolation: Newton's forward and backward interpolation formulae – Lagrange's formulae. Gauss forward and backward formula, Stirling's formula, Bessel's formula.

UNIT – IV

Curve fitting: Fitting of a straight line – Second degree curve – Exponentional curve-Power curve by method of least squares. Numerical Differentiation for Newton's interpolation formula. Numerical Integration: Newton's – Cotes formula - Trapezoidal rule – Simpson's 1/3 Rule – Simpson's 3/8 Rule.

UNIT – V

Numerical solution of Ordinary Differential equations: Solution by Taylor's series-Picard's Method of successive approximations-Euler's, Runge-Kutta 2nd and 4th order Methods– Milne's Predictor-Corrector Methods.

Text Books:

3. Higher Engineering Mathematics, B.S.Grewal, Khanna publishers.
4. Introductory Methods of Numerical Analysis, S.S. Sastry, PHI publisher.

2.7.2018

References:

1. Engineering Mathematics, Volume - II, E. Rukmangadachari Pearson Publisher.
2. Mathematical Methods by T.K.V. Iyengar, B.Krishna Gandhi, S. Ranganatham and M.V.S.S.N.Prasad, S. Chand publication.
3. Higher Engineering Mathematics, by B.V.Ramana, Mc Graw Hill publishers.
4. Advanced Engineering Mathematics, by Erwin Kreyszig, Wiley India.

Outcomes:

At the end of the course, student will be able to analyze engineering problems using the concepts of Matrices and Numerical methods.

2.7.18

II B.Tech I Sem

15AEC05-SIGNALS AND SYSTEMS

L	T	P	C
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Objectives:

1. To study about signals and systems.
2. To do analysis of signals & systems (continuous and discrete) using time domain & frequency domain methods.
3. To understand the stability of systems through the concept of ROC.
4. To know various transform techniques in the analysis of signals and systems.

Learning Outcomes:

a. For integro-differential equations, the students will have the knowledge to make use of Laplace transforms.
b. For continuous time signals the students will make use of Fourier transform and Fourier series.
c. For discrete time signals the students will make use of Z transforms.
d. The concept of convolution is useful for analysis in the areas of linear systems and communication theory.

UNIT - I

Signals and Systems: Continuous-Time and Discrete-Time Signals, Transformations of the Independent Variable, Exponential and Sinusoidal Signals, the Unit Impulse and Unit Step Functions, Continuous-Time and Discrete-Time Systems, Basic System Properties, Linear Time-Invariant Systems - Discrete-Time LTI Systems, The Convolution Sum, Continuous-Time LTI Systems - The Convolution Integral, Properties of Linear Time-Invariant Systems, Causal LTI Systems Described by Differential and Difference Equations, Singularity Functions.

UNIT-II

Fourier Series Representation of Periodic Signals: The Response of LTI Systems to Complex Exponentials. Fourier Series Representation of Continuous-Time Periodic Signals, Convergence of the Fourier Series, Properties of Continuous-Time Fourier Series, Fourier Series Representation of Discrete-Time Periodic Signals, Properties of Discrete-Time Fourier Series, Fourier Series and LTI Systems, Filtering - Examples of Continuous-Time Filters Described by Differential Equations, Examples of Discrete-Time Filters Described by Difference Equations.

UNIT-III

The Continuous-Time Fourier Transform: Representation of aperiodic Signals, The Continuous-Time Fourier Transform, The Fourier Transform for Periodic Signals, Properties of the Continuous-Time Fourier Transform, The Convolution Property, Fourier Properties and Basic Fourier Transform Pairs, Systems characterized by Linear constant coefficient differential equations, The Discrete-Time Fourier Transform - Representation of Aperiodic Signals, The Discrete-Time Fourier Transform, The Convolution Property, Fourier Transform Properties and Basic Fourier Transform Pairs, Duality, Systems Characterized by Linear Constant-Coefficient Difference Equations.

UNIT-IV

Time & Frequency Characterization of Signals and Systems: The Magnitude-Phase Representation of the Fourier Transform, The Magnitude-Phase Representation of the Frequency Response of LTI Systems, Time-Domain Properties of Ideal Frequency-Selective Filters, Time-Domain and Frequency-Domain Aspects of Non-ideal Filters, First-Order and Second-Order Continuous-Time Systems, First-Order and Second-Order Discrete-Time Systems, Examples of Time- and Frequency-Domain Analysis of Systems,

Sampling: Representation of a Continuous-Time Signal by Its Samples - Sampling Theorem, Reconstruction of a Signal from Its Samples Using Interpolation. Effect of under sampling: Aliasing, Discrete-Time Processing of Continuous-Time Signals.

UNIT-V

Laplace and z-Transforms: The Laplace Transform. The Region of Convergence for Laplace Transforms, The Inverse Laplace Transform, Geometric Evaluation of the Fourier Transform from the Pole-Zero Plot, Properties of the Laplace Transform, Some Laplace Transform Pairs, Analysis and Characterization of LTI Systems Using the Laplace Transform, System Function Algebra and Block Diagram Representations, Unilateral Laplace Transform, The Z-Transform - Region of Convergence for the z-Transform, The Inverse z-Transform, Geometric Evaluation of the Fourier Transform from the Pole-Zero Plot, Properties of the z-Transform, Some Common z-Transform Pairs, Analysis and Characterization of LTI Systems Using z-Transforms, System Function Algebra and Block Diagram Representations, Unilateral z-Transforms.

Text Books:

1. Signals and Systems, Alan V. Oppenheim, Alan S. Willsky, & S. Hamid, 2nd Edition, Pearson Higher Education, 1997.
2. Principles of Linear Systems and Signals, B.P. Lathi, 2nd Edition, Oxford University Press, 2011.

References:

1. Signals & Systems, Simon Haykin and B. Van Veen, 2nd Edition, John Wiley, 2003.
2. Signals and systems, Narayana Iyer and K Satya Prasad, 1st Edition, CENGAGE Learning, 2011.
3. Signals, Systems and Transforms, C. L. Philips, J. M. Parr and Eve A. Riskin, 4th Edition, Pearson education, 2008.

II B.Tech I Sem

15AEC06-SWITCHING THEORY AND LOGIC DESIGN

L	T	P	C
3	1	0	3

Course Objectives:

To provide fundamental concepts used in the design of digital systems and learn the methods for the design of digital circuits.

Course Outcomes:

a. To introduce basic postulates of Boolean algebra and the methods for simplifying Boolean expressions
b. To illustrate the concepts and study the procedures for the analysis and design of combinational circuits and sequential circuits
c. To introduce the concepts of programmable logic devices.

UNIT I

Number System & Boolean Algebra: Digital Systems, Binary Numbers, Number base conversions, Complements of numbers, Signed binary numbers, Binary codes. Boolean Algebra-Basic definition, Basic theorems and properties, Boolean Functions, Canonical & Standard forms, Other logic operations & Logic gates.

UNIT I

Gate Level Minimization: The map method, four variable, K-map, Five variable map, POS & SOP Simplification, Don't care conditions, NAND & NOR Implementation, Other two level Implementation, Ex-or Function, Tabular Method- Simplification of Boolean function using tabulation Method.

UNIT III

Analysis And Synthesis Of Combinational Circuits: Combinational circuits, Analysis & Design procedure, Binary Adder-Subtractor, Decimal Adder, Binary Multiplier, Magnitude comparator, Decoder, Encoders, Multiplexers.

UNIT IV

Analysis And Synthesis Of Sequntial Circuits: Sequential Circuits, Latches Flips-Flops, Analysis of Clocked sequential circuits, State Reduction & Assignment, Design procedure, Registers & Counters – Registers, Shift Registers, Ripple Counters, Synchronous counters, other counters.

UNIT V

Asynchronous sequential Logic & Programmable Memories: Introduction, Analysis Procedure, Circuits with Latches, Design Procedure, Reduction of State flow tables, Race-free

State Assignment, Hazards. Random Access Memory, Memory Decoding Errordetection and correction, ROM, PLA, PAL.

Text Books:

1. Digital Design, M.Morris Mano & Michel D. Ciletti, 5th Edition, Pearson Education, 1999.
2. Switching theory and Finite Automata Theory, Zvi Kohavi and Nirah K.Jha, 2nd Edition, Tata McGraw Hill, 2005.

References

1. Fundamentals of Logic Design, Charles H Roth,Jr., 5th Edition, Brooks/cole Cengage Learning, 2004.
2. Digital & State Machine Design, Comer, 3rd Edition, OXFORD.
3. Fundamentals Digital Circuits, A.Anand Kumar, 3rd Edition, PHI, 2014.

II B.Tech I Sem

15AEE10-ELECTRICAL TECHNOLOGY

L	T	P	C
3	1	0	3

UNIT _I: DC Generators

D.C. Generators – Principle of Operation – Action of Commutator – Constructional Features – Armature Windings – Lap and Wave Windings- E. M.F Equation– Numerical Problems - Methods of Excitation – Separately Excited and Self Excited Generators – Build-Up of E.M.F - Critical Field Resistance and Critical Speed - Causes for Failure to Self Excite and Remedial Measures-Load Characteristics of Shunt, Series and Compound Generators.

UNIT _II: DC Motors

D.C Motors – Principle of Operation – Back E.M.F. – Torque Equation – Characteristics and Application of Shunt, Series and Compound Motors- Speed Control of D.C. Motors: Armature Voltage and Field Flux Control Methods- Motor Starters (3 Point and 4 Point Starters)- Losses – Constant & Variable Losses – Calculation of Efficiency – Condition for Maximum Efficiency. Methods of Testing – Direct, Indirect – Brake Test – Swinburne's Test.

UNIT _III: Transformers

Single Phase Transformers-Types - Constructional Details--Emf Equation - Operation on No Load and on Load - Phasor Diagrams - Equivalent Circuit - Losses and Efficiency-Regulation - OC and SC Tests - Sumpner's Test - Predetermination of Efficiency and Regulation-Separation of Losses Test- Auto Transformers-Equivalent Circuit.

UNIT _IV: Induction Motors And Alternators

Induction Motors-Construction Details – Principle of operation - Rotor Power Input, Rotor Copper Loss and Mechanical Power Developed and Their Inter Relation – torque –slip characteristics – simple problems. Principle and operation of alternator - Pitch, Distribution, Winding Factors – E.M.F Equation- Principle and operation of synchronous motors.

UNIT – V Single Phase And Special Motors

Single Phase Induction Motor - Constructional Features – Double Revolving Field Theory-Elementary Idea of Cross Field Theory – Split Phase Motors – Capacitor Start and Run Motors – Shaded Pole Motor. Principle and Performance of A.C Series Motor - Universal Motor – Single Phase Synchronous Motors – Reluctance Motor – Hysteresis Motor – Stepper Motor.

TEXT BOOKS:

1. Electrical Machines – by P.S. Bimbra, Khanna Publishers
2. Principles of Electrical Engineering – By Ashfaq Hussian, Dhanapat Roy & Sons

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II B.Tech I Sem

15AEC07-PROBABILITY THEORY & STOCHASTIC PROCESSES

L	T	P	C
3	1	0	3

Objectives:

1. To understand the concepts of a Random Variable and operations that may be performed on a single Random variable.
2. To understand the concepts of Multiple Random Variables and operations that may be performed on Multiple Random variables.
3. To understand the concepts of Random Process and Temporal & Spectral characteristics of Random Processes.

Outcomes: A student will able to determine the temporal and spectral characteristics of random signal response of a given linear system.

UNIT-I

Probability: Probability introduced through Sets and Relative Frequency: Experiments and Sample Spaces, Discrete and Continuous Sample Spaces, Events, Probability Definitions and Axioms, Mathematical Model of Experiments, Probability as a Relative Frequency, Joint Probability, Conditional Probability, Total Probability, Bays' Theorem, Independent Events:

The Random Variable: Definition of a Random Variable, Conditions for a Function to be a Random Variable, Discrete and Continuous, Mixed Random Variable, Distribution and Density functions, Properties, Binomial, Poisson, Uniform, Gaussian, Exponential, Raleigh, Conditional Distribution, Conditional Density, Properties.

UNIT-II

Multiple Random Variables: Vector Random Variables, Joint Distribution Function, Properties of Joint Distribution, Marginal Distribution Functions, Conditional Distribution and Density – Point Conditioning, Conditional Distribution and Density – Interval conditioning, Statistical Independence, Sum of Two Random Variables, Sum of Several Random Variables, Central Limit Theorem, (Proof not expected). Unequal Distribution, Equal Distributions.

Operations on Multiple Random Variables: Expected Value of a Function of Random Variables, Joint Moments about the Origin, Joint Central Moments, Joint Characteristic Functions, Jointly Gaussian Random Variables: Two Random Variables case, N Random Variable case, Properties, Transformations of Multiple Random Variables.

UNIT-III

Random Processes – Temporal Characteristics: The Random Process Concept, Classification of Processes, Distribution and Density Functions, concept of Stationarity and Statistical Independence. First-Order Stationary Processes, Second- Order and Wide-Sense Stationarity, (N-Order) and Strict-Sense Stationarity, Time Averages and Ergodicity, Mean-Ergodic Processes, Correlation-Ergodic Processes, Autocorrelation Function and Its Properties, Cross-Correlation

Function and its Properties, Covariance Functions, Gaussian Random Processes, Poisson Random Process.

UNIT-IV

Random Processes – Spectral Characteristics: The Power Spectrum: Properties, Relationship between Power Spectrum and Autocorrelation Function, The Cross-Power Density Spectrum, Properties, Relationship between Cross-Power Spectrum and Cross-Correlation Function.

UNIT-V

Linear Systems with Random Inputs: Random Signal Response of Linear Systems: System Response – Convolution, Mean and Mean-squared Value of System Response, autocorrelation Function of Response, Cross-Correlation Functions of Input and Output, Spectral Characteristics of System Response: Power Density Spectrum of Response, Cross-Power Density Spectrums of Input and Output, Band pass, Band-Limited and Narrowband Processes, Properties.

<u>Text Books</u> :

1. Probability, Random Variables & Random Signal Principles, Peyton Z. Peebles, 4^{th} Edition, Tata McGraw Hill, 2001.
2. Probability, Random Variables and Stochastic Processes, Athanasios Papoulis and S. Unnikrishna Pillai, 4^{th} Edition, PHI, 2002.

<u>References</u>:

1. Probability Theory and stochastic Processes, P.Ramesh Babu, 1^{st} Edition, McGraw Hill Education, 2014.
2. Probability Methods of Signal and System Analysis, George R. Cooper, Clave D. MC Gillem, 3^{rd} Edition, Oxford, 1999.

II B.Tech I Sem

15AEC03-ELECTRONIC DEVICES AND CIRCUITS LABORATORY

L	T	P	C
0	0	3	2

Objectives: This Lab provides the students to get an electrical model for various semiconductor devices. Students can find and plot V_I characteristics of all semiconductor devices. Student learns the practical applications of the devices. They can learn and implement the concept of the feedback and frequency response of the small signal amplifier

PART A: Electronic Workshop Practice

1. Identification, Specifications, Testing of R, L, C Components (Colour Codes), Potentiometers, Coils, Gang Condensers, Relays, Bread Boards.
2. Identification, Specifications and Testing of active devices, Diodes, BJTs, JFETs, LEDs, LCDs, SCR, UJT.
3. Soldering Practice- Simple circuits using active and passive components.
4. Study and operation of Ammeters, Voltmeters, Transformers, Analog and Digital Multimeter, Function Generator, Regulated Power Supply and CRO.

PART B: List of Experiments
(For Laboratory Examination-Minimum of Ten Experiments)

3. P-N Junction Diode Characteristics
   a. Germanium Diode (Forward bias& Reverse bias)
   b. Silicon Diode (Forward bias only)
2. Zener Diode Characteristics
   a. V-I Characteristics
   b. Zener Diode act as a Voltage Regulator
3. Rectifiers (without and with c-filter)
   a. Half-wave Rectifier
   b. Full-wave Rectifier
4. BJT Characteristics(CE Configuration)
   a. Input Characteristics
   b. Output Characteristics
5. FET Characteristics(CS Configuration)
   a. Drain (Output) Characteristics
   b. Transfer Characteristics
6. SCR Characteristics
7. UJT Characteristics
8. Transistor Biasing
9. CRO Operation and its Measurements
10. BJT-CE Amplifier
11. Emitter Follower-CC Amplifier
12. FET-CS Amplifier

PART C: Equipment required for Laboratory

1. Regulated Power supplies
2. Analog/Digital Storage Oscilloscopes
3. Analog/Digital Function Generators
4. Digital Multimeters
5. Decade Résistance Boxes/Rheostats
6. Decade Capacitance Boxes
7. Ammeters (Analog or Digital)
8. Voltmeters (Analog or Digital)
9. Active & Passive Electronic Components
10. Bread Boards
11. Connecting Wires
12. CRO Probes etc.

Outcomes: Students able to learn electrical model for various semiconductor devices and learns the practical applications of the semiconductor devices

II B.Tech I Sem

15AEE11-ELECTRICAL TECHNOLOGY LAB

L	T	P	C
0	0	3	2

Course objective for Electrical technology lab:

1. Students can learn about fundamental concepts circuits, DC, AC Machines.
2. Students can learn about Electrical instruments.
3. Student learn how to apply electrical principles in their applications.
4. Student can able verify theorems such as super position, thevinins and maximum power transfer and the measurements of RLC parameters using bridge principles

Course outcome for Electrical technology lab:

1. Students able to demonstrate knowledge on fundamental concepts circuits, DC, AC Machines.
2. Students able to demonstrate knowledge on how to measure the electrical quantities using measuring instruments.
3. Students are able to apply electrical principles in their applications.
4. Students are able to determine the RLC parameters using bridge principles.

PART-A

1. Series and parallel resonance- timing, resonant frequency, Bandwidth and Q-Factor determination for RLC Network.
2. Time response of first order RC/RL network for periodic non sinusoidal inputs-time constant
   and steady state error determination.
3. Z and Y Parameters.
4. Verification of Superposition Theorem and Reciprocity Theorem
5. Verification of Maximum Power Transfer Theorem
6. Verification of Thevenin's and Norton's Theorems.

PART-B

1. Magnetization Characteristics of DC Shunt Generator. Determination of Critical Field Resistance and Critical Speed.
2. Swinburne's Test and Speed Control of DC Shunt Motor. Predetermination of Efficiencies.
3. Brake Test on DC Shunt Motor. Determination of Performance Curves.
4. O.C. & S.C. Tests on Single phase Transformer
5. Brake Test on Three Phase Induction Motor
6. Regulation of Three-Phase Alternator by Z.P.F. and A.S.A Methods

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II B.Tech I SEM

15AHS04-HUMAN VALUES AND PROFESSIONAL ETHICS

(Common for all Branches)

L	T	P	C
3	1	0	3

Objectives

- To create an awareness on Engineering Ethics and Human Values.
- To instill Moral and Social Values and Loyalty
- To appreciate the rights of Others

UNIT-I: Human Values

Morals, Values and Ethics-Integrity-Work Ethic-Service learning – Civic Virtue – Respect for others – Living Peacefully – Caring – Sharing – Honesty - Courage- Co Operation – Commitment – Empathy –Self Confidence Character – Spirituality.

UNIT-II: Engineering Ethics

Senses of 'Engineering Ethics'- Variety of moral issued – Types of inquiry – Moral dilemmas – Moral autonomy –Kohlberg's theory- Gilligan's theory- Consensus and controversy – Models of professional roles- Theories about right action- Self-interest - Customs and religion –Uses of Ethical theories – Valuing time –Cooperation – Commitment.

UNIT-III : Engineering As Social Experimentation

Engineering As Social Experimentation – Framing the problem – Determining the facts – Codes of Ethics – Clarifying Concepts – Application issues – Common Ground - General Principles – Utilitarian thinking –respect for persons.

UNIT-IV: Engineers Responsibility For Safety And Risk

Safety and risk – Assessment of safety and risk – Risk benefit analysis and reducing risk- Safety and the Engineer- Designing for safety.

UINIT-V: Global Issues

Globalization – Cross Cultural issues- Environmental Ethics – Computer Ethics – Computers as the instrument of Unethical behavior – Computers as the object of Unethical acts – Autonomous Computers- Computer codes of Ethics – Weapons Development - Ethics and Research – Analyzing Ethical Problems in research – Intellectual property Rights(IPR).

Out Comes:

- Identify and analyze an ethical issue in the subject matter under investigation or in a relevant field
- Identify the multiple ethical interests at stake in a real-world situation or practice
- Articulate what makes a particular course of action ethically defensible
- Assess their own ethical values and the social context of problems

- Identify ethical concerns in research and intellectual contexts, including academic integrity, use and citation of sources, the objective presentation of data, and the treatment of human subjects
- Demonstrate knowledge of ethical values in non-classroom activities, such as service learning, internships, and field work
- Integrate, synthesize, and apply knowledge of ethical dilemmas and resolutions in academic settings, including focused and interdisciplinary research

Text Books

1. Engineering Ethics includes Human Values by M.Govindarajan, S.Natarajan and V.S.SenthilKumar-PHI Learning Pvt. Ltd-2009.
2. Engineering Ethics by Harris, Pritchard and Rabins, CENGAGE Learning, India Edition, 2009.
3. Ethics in Engineering by Mike W. Martin and Roland Schinzinger – TMH- 2003.
4. Professional Ethics and Morals by Prof.A.R.Aryasri, Dharanikota Suyodhana, Maruthi Publications.
5. Professional Ethics and Human Values by A.Alavudeen, R.Kalil Rahman and M.Jayakumaran- Laxmi Publications.
6. Professional Ethics and Human Values by Prof.D.R.Kiran-
7. Indian Culture, Values and Professional Ethics by PSR Murthy-BS Publication.

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II B.Tech II Sem

15ABS10-MATHEMATICS –IV
(Common for EEE and ECE)

L	T	P	C
3	1	0	3

Objectives: To enable the students to understand the mathematical concepts of special functions & complex variables and their applications in science and engineering.

UNIT – I: Special Functions: Gamma and Beta Functions – their properties – Evaluation of improper integrals. Series Solutions of ordinary differential equations (Power series and Frobenius Method).

UNIT – II: Bessel functions – Properties – Recurrence relations – Orthogonality. Legendre polynomials – Properties – Rodrigue's formula – Recurrence relations – Orthogonality.

UNIT – III

Functions of a complex variable – Continuity – Differentiability – Analyticity – Properties – Cauchy-Riemann equations in Cartesian and polar coordinates. Harmonic and conjugate harmonic functions – Milne – Thomson method.

Conformal mapping: Transformation of e^z, lnz, z^2, Sin z, cos z, Bilinear transformation - Translation, rotation, magnification and inversion – Fixed point – Cross ratio – Determination of bilinear transformation.

UNIT – IV

Complex integration: Line integral – Evaluation along a path and by indefinite integration – Cauchy's integral theorem – Cauchy's integral formula – Generalized integral formula.

Complex power series: Radius of convergence – Expansion in Taylor's series, Maclaurin's series and Laurent series. Singular point – Isolated singular point – Pole of order m – Essential singularity.

UNIT – V

Residue – Evaluation of residue by formula and by Laurent's series – Residue theorem.

Evaluation of integrals of the type

(a) Improper real integrals $\int_{-\infty}^{\infty} f(x)dx$ (b) $\int_{c}^{c+2\pi} f(\cos\theta, \sin\theta)d\theta$ (c) $\int_{-\infty}^{\infty} e^{imx} f(x)dx$

Text Books:

1. Higher Engineering Mathematics, B.S.Grewal, Khanna publishers.
2. Engineering Mathematics, Volume - III, E. Rukmangadachari & E. Keshava Reddy, Pearson Publisher

References:

1. Complex variables and applications by Ruel. V. Churchill and J. W. Brown, 8th edition, 2008, McGraw-Hill.

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2. Advanced Engineering Mathematics, by Erwin Kreyszig, Wiley India.
3. Advanced Mathematics for Engineers and Scientists by B. Rambhupal Reddy, Research India Publications.
4. Higher Engineering Mathematics, by B.V.Ramana, Mc Graw Hill publishers.

Outcomes:

At the end of the course, the student achieves the knowledge to analyze the problems using the methods of special functions and complex variables.

II B.Tech II Sem

15AHS05-MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS

(Common for EEE, ECE and CSE)

L	T	P	C
3	1	0	3

Course Objectives:

1. To enhance the knowledge of the students regarding importance of management and Managerial problems with optimum solutions.
2. To develop the concepts viz., Consumer Behaviour and demand-supply concept.
3. To introduce the concept of Demand Forecasting-methods.
4. To provide the knowledge regarding production and cost and Break-Even Analysis.
5. To share the concepts like market structures and Business Organization.
6. To discuss the contemporary practices-which influences the organization?
7. To provide awareness regarding Capital Budgeting decisions(Long term Investment decisions)
8. To introduce the concepts- Financial Accounting and Financial Analysis.
9. To give an idea of practicing technique of Ratio Analysis.
10. To provide the basic concepts which are related to managerial?

Unit I

Introduction to Managerial Economics & Demand Analysis: Definition of Managerial Economics, Characteristics and Scope – Managerial Economics and its relation with other subjects- Basic economic tools in Managerial Economics.

Demand Analysis: Meaning- Demand distinctions- Demand determinants- Law of Demand and its exceptions.

Elasticity of Demand & Theory of Production and Cost Analysis: Definition -Types of Elasticity of demand - Measurement of price elasticity of demand: Total outlay method, Point method and Arc method- Significance of Elasticity of Demand.

Unit-II

Demand Forecasting: Meaning - Factors governing demand forecasting - Methods of demand forecasting - Forecasting demand for new products- Criteria of a good forecasting method.

Theory of Production and Cost Analysis: Production Function- Isoquants and Isocosts, MRTS, Cobb-Douglas Production function.

Cost Analysis: Cost concepts, Opportunity cost, Fixed Vs Variable costs, Explicit costs Vs. Implicit costs, Out of pocket costs vs. Imputed costs. Break even analysis -Determination of Break-Even Point (simple problems) - Managerial Significance and limitations of BEP.

Unit-III

Introduction to Markets & Pricing Policies: Market structures: Types of competition, Features of Perfect Competition, Monopoly and Monopolistic Competition. Price-Output Determination under Perfect Competition, Monopoly, Monopolistic Competition.

Pricing Policies: Methods of Pricing-Marginal Cost Pricing, Limit Pricing, Market Skimming Pricing, Penetration Pricing, Bundling Pricing, and Peak Load Pricing. Internet Pricing Models:

Flat rate pricing, Usage sensitive pricing, Transaction based pricing, Priority pricing, charging on the basis of social cost, Precedence model, Smart market mechanism model.

UNIT-IV

Types of Industrial Organization & Introduction to business cycles: Characteristic features of Industrial organization, Features and evaluation of Sole Proprietorship, Partnership, Joint Stock Company, State/Public Enterprises and their types.

Introduction to business cycles: Meaning - Features of business cycles.

Capital and Capital Budgeting: Meaning of capital budgeting, Need for capital budgeting – Capital budgeting decisions (Examples of capital budgeting) - Methods of Capital Budgeting: Payback Method, Accounting Rate of Return (ARR), IRR and Net Present Value Method (simple problems).

Unit V

Introduction to Financial Accounting: Introduction to Double-entry system, Journal, Ledger, Trial Balance- Final Accounts (with simple adjustments) - Limitations of Financial Statements.

Interpretation and analysis of Financial Statement: Ratio Analysis – Liquidity ratios, Profitability ratios and solvency ratios – Preparation of changes in working capital statement and fund flow statement.

Learning Outcomes:

Expected to achieve the overall course objective to understand and enhancing the knowledge regarding managerial concepts and obtaining optimal solutions. And to get an idea of analysis of firm's financial position with the techniques of financial analysis and ratio analysis.

Text Books:

1. **J.V. Prabhakar Rao**: Managerial Economics and Financial Analysis, Maruthi Publications, 2011
2. **N. Appa Rao. & P. Vijaya Kumar**: 'Managerial Economics and Financial Analysis', Cengage Publications, New Delhi, 2011

References:

1. **A R Aryasri** - Managerial Economics and Financial Analysis, TMH 2011
2. **Suma damodaran**- Managerial Economics, **Oxford** 2011
3. **S.A. Siddiqui & A.S. Siddiqui**, Managerial Economics and Financial Analysis, New Age International Publishers, 2011.

II B.Tech II Sem

15AEC11-CONTROL SYSTEMS ENGINEERING

L	T	P	C
3	1	0	3

Objectives:

To make the students learn about:

- Merits and demerits of open loop and closed loop systems; the effect of feedback
- The use of block diagram algebra and Mason's gain formula to find the effective transfer function
- Transient and steady state response , time domain specifications
- The concept of Root loci
- Frequency domain specifications, Bode diagrams and Nyquist plots
- The fundamental aspects of modern control

UNIT – I Introduction

Open Loop and closed loop control systems and their differences- Examples of control systems- Classification of control systems, Feedback Characteristics, Effects of positive and negative feedback. Mathematical models – Differential equations of Translational and Rotational mechanical systems, and Electrical Systems, Block diagram reduction methods – Signal flow graph - Reduction using Mason's gain formula. Transfer Function of DC Servo motor - AC Servo motor - Synchro transmitter and Receiver

UNIT-II Time Response Analysis

Step Response - Impulse Response - Time response of first order systems – Characteristic Equation of Feedback control systems, Transient response of second order systems - Time domain specifications – Steady state response - Steady state errors and error constants

UNIT – III Stability

The concept of stability – Routh's stability criterion – Stability and conditional stability – limitations of Routh's stability. The root locus concept - construction of root loci-effects of adding poles and zeros to G(s)H(s) on the root loci.

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UNIT – IV Frequency Response Analysis

Introduction, Frequency domain specifications-Bode diagrams-Determination of Frequency domain specifications and transfer function from the Bode Diagram-Stability Analysis from Bode Plots. Polar Plots-Nyquist Plots- Phase margin and Gain margin-Stability Analysis. Compensation techniques – Lag, Lead, Lag-Lead Compensator design in frequency Domain.

UNIT – V State Space Analysis

Concepts of state, state variables and state model, derivation of state models from differential equations. Transfer function models. Block diagrams. Diagonalization. Solving the Time invariant state Equations- State Transition Matrix and it's Properties. System response through State Space models. The concepts of controllability and observability.

Outcomes:

After completing the course, the student should be able to do the following:

- Evaluate the effective transfer function of a system from input to output using (i) block diagram reduction techniques (ii) Mason's gain formula
- Compute the steady state errors and transient response characteristics for a given system and excitation
- Determine the absolute stability and relative stability of a system
- Draw root loci
- Design a compensator to accomplish desired performance
- Derive state space model of a given physical system and solve the state equation

Text Books:

1. Modern Control Engineering – by Katsuhiko Ogata – Prentice Hall of India Pvt. Ltd., 5th edition, 2010.
2. Control Systems Engineering – by I. J. Nagrath and M. Gopal, New Age International (P) Limited, Publishers, 5th edition, 2007.

Reference Books:

1. Control Systems Principles & Design 4th Edition, M.Gopal, Mc Graw Hill Education, 2012.
2. Automatic Control Systems– by B. C. Kuo and Farid Golnaraghi – John wiley and son's, 8th edition, 2003.
3. Control Systems 3rd Edition, Joseph J Distefano III, Allen R Stubberud & Ivan J Williams, Schaum's Mc Graw Hill Education.

John J D'Azzo and C. H. Houpis , "Linear Control System Analysis and Design Conventional and Modern", McGraw - Hill Book Company, 1988.

BOS chairman

II B.Tech II Sem

15AEC13-ELECTRONIC CIRCUIT ANALYSIS & DESIGN

L	T	P	C
3	1	0	3

Course Objectives: The aim of this course is

1. To familiarize the student with the analysis and design of multistage amplifiers with compound connections, feedback amplifiers, oscillators, power amplifiers and tuned amplifiers.
2. To study and analyze the frequency response of amplifier circuits.

Course Outcomes: Upon completion of this course, student will be able to :

a. Analyze the frequency response of the BJT amplifiers at low and high frequencies.
b. Analyze and design multistage amplifiers with compound connections, feedback amplifiers, oscillators, power amplifiers and tuned amplifiers.

UNIT I

Multistage Amplifiers:

Classification of Amplifiers- Distortion in amplifiers, Analysis of CE amplifier with Emitter Resistance and Emitter follower, Different Coupling Schemes used in Amplifiers – RC Coupled Amplifier, Direct and Transformer Coupled Amplifiers, Frequency Response of BJT Amplifier, Design of Single stage RC Coupled Amplifier Using BJT, Analysis of Cascaded RC Coupled BJT Amplifiers, Darlington Pair, Cascode Amplifier, Illustrative design problems.

UNIT II

High Frequency Response

Logarithms, Decibels, General Frequency considerations, Analysis of BJT amplifiers at High Frequencies, Effect of Coupling and bypass Capacitors, The Hybrid-pi (π)- Common Emitter Transistor Model, CE short Circuit Current gain, Current gain with Resistive Load, Single Stage CE Transistor Amplifier response, Gain-Bandwidth Product, Emitter follower at higher frequencies, Illustrative design problems.

UNIT III: Feedback Amplifiers

Concepts of Feedback, Classification of Feedback Amplifiers, General Characteristics of Negative Feedback Amplifiers, Effect of Feedback on Amplifier characteristics, Voltage Series, Voltage Shunt, Current Series and Current Shunt Feedback Configurations, Illustrative design Problems.

UNIT IV: Oscillators

Conditions for Oscillations, RC and LC type Oscillators, RC-Phase shift and Wien-Bridge Oscillators, Generalized Analysis of LC Oscillators, Hartley and Colpitts Oscillators, Crystal Oscillators, Frequency and Amplitude Stability of Oscillators, Illustrative design problems.

UNIT V:

Power Amplifiers: Classification, Series fed Class A Power Amplifier, Transformer Coupled Class A Amplifier, Efficiency, Push Pull Amplifier- Complementary Symmetry Class-B Power Amplifier, Amplifier Distortion, Power Transistor Heat sinking, Class C and Class D Power amplifiers, Illustrative design problems.

Introduction to Tuned amplifiers: Q-Factor, Single tuned, double tuned and stagger tuned amplifiers.

Text Books:

1. Integrated Electronics, Jacob Millman, Christos C Halkias, 2nd Edition, Mc Graw Hill, 2002.
2. Electronic Devices and Circuit Theory, Robert L.Boylestad, Louis Nashelsky, 9th Edition, Pearson, 2008.

Reference Books:

1. Electronic Circuit Analysis, K.Lal Kishore, 2nd Edition, BSP, 2004.
2. Electronic Circuits Analysis and Design, Donald A Neamen, 3rd Edition, Tata McGraw-Hill, 2009.
3. Microelectric circuits, Sedra, Kenneth, Smith, 5th Edition, Oxford University Press, 2011.
4. Electronic Circuit and Applications, Mohammad H. Rashid, 3rd Edition, CENGAGE Learning, 2009..

Introductory Electronic Devices and Circuits, Robert T. Paynter, 7th edition, PEI, 2009.

II B.Tech II Sem

15AEC14-PULSE AND DIGITAL CIRCUITS

L	T	P	C
3	1	0	3

Objectives:-

1. To study various wave shaping circuits and their applications.
2. To study different circuits that produce non-sinusoidal waveforms (multivibrators) and their applications
3. To study various voltage time base generators and their applications.
4. To study different logic families and their comparison.

Outcomes: Students will be able to design different pulse circuits based on the above concepts.

UNIT I

Linear Wave Shaping: High pass, low pass RC circuits, their response for sinusoidal, step, pulse, square and ramp inputs. High Pass RC network as Differentiator, Low Pass RC network as integrator, attenuators and its applications as a CRO probe, RL circuits and its response for step input, Illustrative Problem .

UNIT II

Non-Linear Wave Shaping: Diode clippers, Transistor clippers, clipping at two independent levels, Comparators, applications of voltage comparators, clamping operation, clamping circuits taking source and Diode resistances into account, Clamping circuit theorem, practical clamping circuits, Illustrative Problems.

UNIT III

Multivibrators: Transistor as a switch, Break down voltages, Transistor-Switching Times, Triggering circuits. Analysis and Design of Bistable, Monostable, Astable Multivibrators and Schmitt trigger circuit using BJT.

UNIT IV

Time Base Generators: General features of a time base signal, methods of generating time base waveform, Miller and Bootstrap time base generators–basic principles, Transistor miller time base generator, Transistor Bootstrap time base generator, Transistor Current time base generators.

UNIT V

Synchronization And Frequency Division: Pulse Synchronization of relaxation Devices, Frequency division in sweep circuit, Stability of relaxation Devices, Astable relaxation circuits, Monostable relaxation circuits, Synchronization of a sweep circuit with symmetrical signals.

Sampling Gates: Basic operating principles of sampling gates, Unidirectional and Bi-directional sampling gates, Four Diode Sampling Gate, Reduction of pedestal in gate circuits, Six Diode Gate, Application of Sampling Gates.

Text Books:

1. Pulse, Digital and Switching Waveforms, J.Millman, H.Taub and Mothiki S. Prakash Rao, 2nd Edition, Tata McGraw Hill, 2008.
2. Solid State Pulse Circuits, David A. Bell, 4th Edition, PHI, 2002.

References:

1. Pulse and Digital Circuits, A. Anand Kumar, 2nd Edition, PHI, 2011.
2. Fundamentals of Pulse and Digital Circuits, Ronald J. Tocci, 3rd Edition, Merrill's International, 2008.

   Wave Generation and Shaping, L. Strauss, 2nd Edition, Tata McGraw Hill, 1960.

II B.Tech II Sem

15AEC15-ELECTROMAGNETIC THEORY & TRANSMISSION LINES

L	T	P	C
3	1	0	3

Pre requisites by Topics:

1. Understanding and the ability to use vector algebra, and vector calculus.
2. Proficiency in the use of vector identities, and various Coordinate systems & transformations.

Learning Outcomes:

This course provides the foundational education in static electromagnetic fields, and time varying electromagnetic waves. Through lecture, and out-of-class assignments, students are provided learning experiences that enable them to:

a. Analyze and solve the problems of electric and magnetic fields that vary with three dimensional spatial co-ordinates as well as with time.
b. Become proficient with analytical skills for understanding propagation of electromagnetic waves in different media.
c. Understand the concept of transmission lines & their applications.
d. Develop technical & writing skills important for effective communication.
e. Acquire team-work skills for working effectively in groups.

UNIT-I

Electrostatics: Review of Vector algebra, Co-ordinate systems & transformation, Vector calculus, Coulomb's Law, Electric Field Intensity – Fields due to Different Charge Distributions, Electric Flux Density, Gauss Law and Applications, Electric Potential, Relations Between E and V, Maxwell's Two Equations for Electrostatic Fields, Electric dipole, Energy Density, Convection and Conduction Currents, Dielectric Constant, Continuity Equation, Relaxation Time, Poisson's and Laplace's Equations, Capacitance – Parallel Plate, Coaxial, Spherical Capacitors, Illustrative Problems.

UNIT-II

Magneto statics: Biot-Savart Law, Ampere's Circuital Law and Applications, Magnetic Flux Density, Maxwell's Two Equations for Magneto static Fields, Magnetic Scalar and Vector Potentials, Forces due to Magnetic Fields, Magnetic torque and moment, Magnetic dipole, Inductances and Magnetic Energy, Illustrative Problems.

UNIT-III

Maxwell's Equations (for Time Varying Fields): Faraday's Law and Transformer e.m.f, Inconsistency of Ampere's Law and Displacement Current Density, Maxwell's Equations in Different Final Forms and Word Statements. Boundary Conditions of Electromagnetic fields: Dielectric-Dielectric and Dielectric-Conductor Interfaces, Illustrative Problems.

UNIT-IV

EM Wave Characteristics: Wave Equations for Conducting and Perfect Dielectric Media, Uniform Plane Waves ,All Relations between E & H, Sinusoidal Variations, Wave Propagation in Lossless and Conducting Media, Wave Propagation in Good Conductors and Good Dielectrics, Skin depth, physical significance of Skin Depth, Reflection and Refraction of Plane Waves – Normal and Oblique Incidences, for both Perfect Conductor and Perfect Dielectrics, Brewster Angle, Critical Angle and Total Internal Reflection, Surface Impedance, Poynting Vector and Poynting Theorem – Applications, Illustrative Problems.

UNIT-V

Transmission Lines: Types, Transmission line parameters (Primary and Secondary), Transmission line equations, Input impedance, Standing wave ratio & power, Smith chart & its applications, Applications of transmission lines of various lengths, Basics of waveguides and resonators. Illustrative Problems.

Text Books:

1. Elements of Electromagnetics, Matthew N.O. Sadiku, 4th Edition, Oxford University Press, 2008.
2. Electromagnetic Waves and Radiating Systems, E.C. Jordan and K.G. Balmain, 2nd Edition, PHI, 2000.

References:

1. Engineering Electromagnetics, William H. Hayt Jr. and John A. Buck, 7th Edition, Tata McGraw Hill, 2006.
2. Electromagnetics, John D. Krauss, 3rd Edition, McGraw Hill, 1988.
3. Networks, Lines, and Fields, John D. Ryder, 2nd Edition, PHI publications, 2012.
4. Electromagnetic Field Theory and Transmission Lines, G. S. N. Raju, 2nd Edition, Pearson Education, 2013.

II B.Tech II Sem

15AEC16-ELECTRONIC CIRCUIT ANALYSIS AND DESIGN LAB

L	T	P	C
0	0	3	2

List of Experiments (12 experiments to be done):

Objectives

- Help students make transition from analysis of electronic circuits to design of electronic circuits.
- To understand the Analysis of transistor at high frequencies.
- To understand the concept of designing of tuned amplifier.
- The student will construct and analyze voltage regulator circuits.
- To understand the circuit configuration and the principle operation of converters, including diode rectifiers, controlled AC-DC converters and DC choppers

Outcomes:

- The ability to analyze and design single and multistage amplifiers at low, mid and high frequencies.
- Designing and analyzing the transistor at high frequencies.
- Determine the efficiencies of power amplifiers.
- Determine Frequency response and design of tuned amplifiers.
- Able to analyze all the circuits using simulation software and Hardware.

I) Design and Simulation in Simulation Laboratory using Any Simulation Software. (Minimum of 6 Experiments):

1. Common Emitter Amplifier
2. Common Source Amplifier
3. A Two Stage RC Coupled Amplifier.
4. Current shunt and Voltage Series Feedback Amplifier
5. Cascade Amplifier
6. Wien Bridge Oscillator using Transistors
7. RC Phase Shift Oscillator using Transistors
8. Class A Power Amplifier (Transformer less)
9. Class B Complementary Symmetry Amplifier
10. High Frequency Common base (BJT) / Common gate (JFET) Amplifier.

II) Testing in the Hardware Laboratory (6 Experiments)

Any Three circuits simulated in Simulation laboratory

Any Three of the following

1. Class A Power Amplifier (with transformer load)
2. Class C Power Amplifier
3. Single Tuned Voltage Amplifier
4. Hartley & Colpitt's Oscillators.
5. Darlington Pair.
6. MOSFET Amplifier

III) Equipment required for Laboratories:

For software simulation of Electronic circuits

Computer Systems with latest specifications.
Connected in LAN (Optional).
Operating system (Windows XP).
Suitable Simulations software.

For Hardware simulations of Electronic Circuits

Regulated Power Supply (0-30V)
CRO's
Functions Generators.
Multimeters.
Components.

II B.Tech II Sem

15AEC17-PULSE & DIGITAL CIRCUITS LAB

L	T	P	C
0	0	3	2

Objectives:

1. To generate Different types of non-sinusoidal signals.
2. To generate and processing of non-sinusoidal signals.
3. To learn about Limiting and storage circuits and their applications.
4. To learn about Different synchronization techniques, basics of different sampling gates and their uses.
5. To obtain Basics of digital logic families.

Outcomes:

a. Student understands the various design and analysis to generate various types of signals.
b. Student can design various digital circuits based on the application and specifications.

Minimum Twelve experiments to be conducted:

1. Linear wave shaping.
2. Non Linear wave shaping – Clippers.
3. Non Linear wave shaping – Clampers.
4. Transistor as a switch.
5. Study of Logic Gates & Some applications.
6. Study of Flip-Flops & some applications.
7. Sampling Gates.
8. Astable Multivibrator.`
9. Monostable Multivibrator.
10. Bistable Multivibrator.
11. Schmitt Trigger.
12. UJT Relaxation Oscillator.
13. Bootstrap sweep circuit.
14. Constant Current Sweep Generator using BJT.

Equipment required for Laboratories:

1.	RPS	-	0 – 30 V
2.	CRO	-	0 – 20 M Hz.
3.	Function Generators	-	0 – 1 M Hz
4.	Components		
5.	Multi Meters		

III B.Tech I Semester

15ACS18 - COMPUTER ARCHITECTURE AND ORGANIZATION

L	T	P	C
3	1	0	3

Course Objectives: *The student can able to*

1. *Understand the structure, function, characteristics and performance issues of computer systems.*
2. *Understand the design of the various functional units of digital computers*
3. *Understand I/O transfer mechanism, design of I/O circuit interfaces and example bus standards (like PCI, SCSI, USB)*
4. *Understand the basic processing unit and how they are connected and how it generates control signals (using hardwired and micro-programmed approaches)*
5. *Understand the different types of memory and how they are related.*
6. *Learn basics of Parallel Computing and Pipelining.*

UNIT-I

Basic Structure of Computers: Computer types, Functional units, basic operational concepts, Bus structures, Data types, Software: Languages and Translators, Loaders, Linkers, Operating systems.

Addressing Methods and Machine Program Sequencing: Memory locations – addresses and encoding of information – main memory operations – Instruction formats and instruction sequences – Addressing modes and instructions – Simple input programming – pushdown stacks – subroutines.

UNIT-II

Register Transfer and Micro Operations: Register transfer Language, Register transfer, Bus and Memory Transfers, Arithmetic Micro operations, Logic Micro operations, shift Micro operations, Arithmetic Logic Shift Unit.

Central Processing Unit: Stack organization, instruction formats, Addressing modes, Data transfer and manipulation, Execution of a complete instruction, Sequencing of control signals, Program Control.

UNIT-III

Micro-Programmed Control: Control Memory, address Sequencing, Micro Program Example, Design of Control Unit.

Computer Arithmetic: Addition and Subtraction, Multiplication Algorithms, Division Algorithms, Floating Point Arithmetic Operations, Decimal Arithmetic Unit, Decimal Arithmetic Operations.

UNIT-IV

Input-Output Organization: Peripheral Devices, Input-Output Interface, Asynchronous Data Transfer, Modes of Transfer, Priority Interrupt, Direct Memory Access (DMA), Input-Output Processor (IOP), Serial Communication.

Memory Organization: Memory hierarchy, main memory, auxiliary memory, Associative memory, Cache memory, Virtual memory, Memory management hardware.

UNIT-V

Pipeline and Vector Processing: Parallel Processing, Pipelining, Arithmetic Pipeline, Instruction Pipeline, RISC Pipeline Vector Processing, Array Processors.

Multi-Processors: Characteristics of Multiprocessors, Interconnection Structures, Inter processor Arbitration, Inter-processor Communication and Synchronization, Cache Coherence.

Course Outcomes: *After completion of the course, the student should be able to*

a. *Learn about computer performance, computer design, and trade-off between cost and performance as well as between hardware and software*
b. *Formulate and solve problems, understand the performance requirements of systems*
c. *Design circuits and also able to identify the issues related to computers.*

Text Books :

1. M. Morris Mano, "Computer system Architecture", Prentice Hall of India (PHI), Third edition.
2. William Stallings, "Computer organization and programming", Prentice Hall of India (PHI) Seventh Edition, Pearson Education (PE) Third edition, 2006.

Reference Books:

1. Carl Hamacher, ZvonksVranesic, SafwatZaky, "Computer Organization" 5th Edition, McGraw Hill, 2002.
2. Andrew S.Tanenbaum, "Structured Computer Organization", 4th Edition PHI/Pearson

III B.Tech I Semester

15AEC24 - ANALOG COMMUNICATION SYSTEMS

L	T	P	C
3	1	0	3

Course Objectives:

1. *To study the fundamental concept of the analog communication systems.*
2. *To study the various analog modulation and demodulation techniques.*
3. *To understand the influence of noise on the performance of analog communication systems, and to acquire the knowledge about information and capacity.*

UNIT- I

Introduction: Elements of communication systems, Information, Messages and Signals, Modulation, Modulation Methods, Modulation Benefits and Applications.

Amplitude Modulation & Demodulation: Baseband and carrier communication, Amplitude Modulation (AM), Side band and carrier power of AM, Generation of amplitude modulated wave- square law Modulator, switching Modulator, Demodulation of AM Waves- Envelope detector, Rectifier detector, Suppressed carrier Modulation, Double sideband suppressed carrier (DSB-SC) Modulation, Generation of DSB-SC signals- Balanced Modulator, Ring Modulator, Demodulation of DSB-SC signals- Synchronous detector, Quadrature amplitude modulation (QAM), Single side band suppressed carrier (SSB-SC) Modulation, Generation of SSB-SC signals-Frequency & Phase discrimination methods, Demodulation of SSB-SC signals-Synchronous detector, Vestigial sideband (VSB) modulation & demodulation, Frequency mixer.

Radio Receiver: Super-heterodyne AM receiver, Sensitivity, Selectivity, and fidelity. Illustrative Problems.

UNIT- II

Angle Modulation &Demodulation: Concept of instantaneous frequency, Generalized concept of angle modulation, Bandwidth of angle modulated waves – Narrow band frequency modulation (NBFM); and Wide band FM (WBFM), Phase modulation, Features of angle modulation, Generation of FM waves – Indirect method, Direct generation; Demodulation of FM, Band pass limiter, Practical frequency demodulators, Power Spectral density, Pre-emphasis & De-emphasis filters, FM receiver, FM Capture Effect, Illustrative Problems.

UNIT- III

Noise in Communication Systems: Thermal noise, Properties of Thermal Noise, Time domain representation of narrowband noise, Filtered white noise, Quadrature representation of narrowband noise, Envelope of narrowband noise plus sine wave, Signal to noise ratio & probability of error, Noise equivalent bandwidth, Effective noise temperature, and Noise figure, Baseband systems with channel noise, Performance analysis of AM, DSB-SC, SSB-SC, FM, PM in the presence of noise, Illustrative Problems.

UNIT- IV

Sampling: Sampling theorem, sampling of continuous time signals, Reconstruction of Signal From its samples, Effect of under sampling, Natural and Flat top sampling

Analog pulse modulation schemes: Pulse amplitude modulation (PAM) & demodulation, Pulse-Time Modulation – Pulse Duration and Pulse Position modulations, and demodulation schemes, Illustrative Problems.

UNIT- V

Information & Channel Capacity: Introduction, Information content of message, Entropy, Entropy of symbols in long independent and dependent sequences, Entropy and information rate of Mark off sources, Shannon's encoding algorithm, Discrete communication channels, Rate of information over a discrete channel, Capacity of discrete memory less channels, Discrete channels with memory, Shannon – Hartley theorem and its implications, Illustrative problems.

Course Outcomes:

This course provides the foundational education in Analog Communication systems, and applications. The students are provided the learning experience through class room teaching and solving assignment & tutorial problems. At the end of course, students should be able to:

a. *Acquire knowledge on the basic concepts of Analog Communication Systems.*
b. *Analyze the various modulation and demodulation systems.*
c. *Verify the effect of noise on the performance of communication systems.*
d. *Analyze the bandwidth and power requirements of analog systems.*
e. *Analyze the different characteristics of receiver.*
f. *Analyze the various Pulse modulation techniques, Information and channel capacity.*

TEXT BOOKS:

1. Simon Haykin, "Communication Systems", 3rd edition, Wiley-India edition, 2010.
2 B. P. Lathi, "Modern Digital and Analog Communication Systems," 3rd Edition, Oxford Univ. press, 2006.
3 A. Bruce Carlson, & Paul B. Crilly, "Communication Systems – An Introduction to Signals & Noise in Electrical Communication", 5th Edition, McGraw-Hill International Edition, 2010.

REFERENCES:

1 Herbert Taub, Donald L Schilling, "Principles of Communication Systems", 3rd Edition, Tata McGraw-Hill, 2009.
2 George Kennedy, Bernard Davis, "Electronics & Communication System", 3rd Edition, Tata McGraw Hill, 2004.

III B.Tech I Semester

15AEC25 - LINEAR IC APPLICATIONS

L	T	P	C
3	1	0	3

Course objectives: To make the students understand basic concepts in the design of electronic circuits using linear integrated circuits and their applications. To introduce some special function IC's.

UNIT –I

DIFFERENTIAL AMPLIFIER AND OPAMPS

Differential amplifiers: Differential amplifier configurations, Balanced and unbalanced output differential amplifiers, current mirror, level translator.

Operational amplifiers: Introduction, Block diagram, Ideal Op-Amp, Equivalent circuit, Voltage Transfer curve, open loop op-amp configurations, Introduction to dual OP-AMP TL082 as a general purpose JFET-input Operational Amplifier.

UNIT –II

OP-AMP WITH NEGATIVE FEEDBACK AND FREQUNCY RESPONSE

Introduction, feedback configurations, voltage series feedback, voltage shunt feedback and differential amplifiers, properties of Practical op-amp.

Frequency response: Introduction, compensating networks, frequency response of internally compensated op-amps and non-compensated op-amps, High frequency op-amp equivalent circuit, open loop gain Vs frequency, close loop frequency response, circuit stability, slew rate.

UNIT-III

OP-AMP APPICATIONS-1

DC and AC amplifiers, peaking amplifiers, summing, scaling and averaging amplifiers, instrumentation amplifier, voltage to current converter, current to voltage converter, integrator, differentiator, active filters, First, Second and Third order Butterworth filter and its frequency response, Tow-Thomas bi-quad filter.

UNIT-IV

OP-AMP APPICATIONS-2

Oscillators: Phase shift and Wien bridge oscillators, square, triangular and sawtooth wave generators, comparators, Zero crossing detector, Schmitt trigger, Characteristics and limitations.

Specialized applications: 555 timer IC (Monostable&Astable operation) & its applications, PLL operating principles, Monolithic PLL, applications, analog amplifier and phase detection, Wide bandwidth precision analog multiplier MPY634 and its applications.

UNIT V

ANALOG TO DIGITAL AND DIGITAL TO ANALOG CONVERTERS

Analog and Digital Data Conversions ,D/A Converter -specifications-Weighted resistor type , R-2R ladder type ,Voltage Mode And current- Mode R-2R ladder types _switches for D/A Converters, High speed sample-and – hold circuits, A/D Converters-specifications-Flash type-Successive Approximation type-Single slope type-Dual slope type –A/D Converter using Voltage –to–Time Conversion–Over sampling A/D Converters..

Course Outcomes: *Upon completion of the course, students will be able to:*

a. *Understanding basic building block of linear integrated circuits and its characteristics.*
b. *Analyze the linear non-linear and specialized applications of operational amplifiers.*
c. *Understand the theory of ADC and DAC.*

TEXT BOOKS:

1. D.RoyChowdhury, "Linear integrated circuits", 2nd Edition, New Age International (P) Ltd, 2003.
2. Ramakanth A.Gayakwad,"Op-amps and Linear ICs", 4th Edition, PHI, 1987.
3. TL082 Data sheet: http://www.ti.com/lit/ds/symlink/tl082.pdf

REFERENCES:

1. R.F.Coughlin and Fredrick Driscoll, "Op-amps and Linear ICs", 6th Edition, PHI.
2. David A.Bell, "Op-amps and Linear ICs", 2nd Edition, Oxford University press, 2010.

III B.Tech I Semester

15AEC26 - DIGITAL IC APPLICATIONS

L	T	P	C
3	1	0	3

Course Objectives:

1. *To be able to use computer-aided design tools for development of complex digital logic circuits*
2. *To be able to model, simulate, verify, analyze, and synthesize with hardware description languages*
3. *To be able to design and prototype with standard cell technology and programmable logic*
4. *To be able to design tests for digital logic circuits, and design for testability*

UNIT-I

CMOS Logic: Introduction to logic families, CMOS logic, CMOS steady state electrical behavior, CMOS dynamic electrical behavior, CMOS logic families.

Bipolar Logic And Interfacing: Bipolar logic, Transistor logic, TTL families, CMOS/TTL interfacing, low voltage CMOS logic and interfacing, Emitter coupled logic, Comparison of logic families, Familiarity with standard 74XX and CMOS 40XX series-ICs – Specifications.

UNIT-II

The VHDL Hardware Description Language: Design flow, program structure, types and constants, functions and procedures, libraries and packages.

The VHDL design elements: Structural design elements, behavioral design elements, time dimension and simulation synthesis.

UNIT-III

Combinational Logic Design: Decoders, encoders, three state devices, multiplexers and demultiplexers, Code Converters, EX-OR gates and parity circuits, comparators, adders & subtractors, ALUs, Combinational multipliers, VHDL models for the above ICs.

UNIT- IV

Design Examples (using VHDL): Barrel shifter, comparators, floating-point encoder, and dual parity encoder.

Sequential logic Design: Latches & flip flops, PLDs, counters, shift register and their VHDL models, Design process of FSM: Moore and Mealy machines and their VHDL models, Synchronous design methodology and it's impediments.

UNIT-V

ROMs: Internal Structure, 2D – decoding commercial types, timing and applications.

Static RAMs: Internal Structure, timing and standard SRAMs, Synchronous SRAMs.

Dynamic RAMs: Internal Structure, timing and standard DRAMs, Synchronous DRAMs.

***Course Outcomes:** Students can*

a. Able to understand digital integrated circuits design

b. Able to use computer-aided design tools for development of complex digital logic circuits.

c. Able to model, simulate, verify, analyze, and synthesize with hardware description languages.

d. Able to design and prototype with standard cell technology and programmable logic.

e. Able to represent any combinational and sequential circuits using digital ICs.

f. Able to design tests for digital logic circuits, and design for testability.

TEXT BOOKS:

1. John F. Wakerly, "Digital Design Principles & Practices," 3rd Edition, PHI/ Pearson Education Asia, 2005.
2. J. Bhasker, "A VHDL Primer," 3rd Edition, Pearson Education/ PHI.

REFERENCES:

1. Charles H. Roth Jr., "Digital System Design Using VHDL," 2nd Edition, PWS Publications, 2008.
2. Stephen Borwn and ZvonkoVramesic, "Fundamentals of Digital Logic with VHDL Design," 2nd Edition, McGraw Hill, 2005.

III B.Tech I Semester

15AEC27 - ELECTRONIC MEASUREMENTS AND INSTRUMENTATION

L	T	P	C
3	1	0	3

Course Objectives:

1. *To study about functioning of different meters associated with measurements of signal characteristics*
2. *To study and employ CRO for measuring Signal characteristics*
3. *To study in detail about different bridges employed for Electronic measurements*
4. *To study working of advanced measuring instruments such as logic analyzers and spectrum analyzers*

UNIT-I

Performance characteristics of Instruments: Static characteristics, Accuracy, Precision, Resolution, Sensitivity, static and dynamic calibration, Errors in Measurement, and their statistical analysis, dynamic characteristics-speed of Response, fidelity, Lag and dynamic error. DC ammeters, DC voltmeters-multirange, range extension/solid state and differential voltmeters, AC voltmeters–multirange, range extension. Thermocouple type RF ammeter, ohm meters, series type, shunt type, multimeter for voltage, current and resistance measurements.

UNIT-II

Oscilloscopes: Introduction, Basic Principle, Standard specifications of CRO,CRT features, vertical and horizontal amplifiers, horizontal and vertical deflection systems, sweep trigger pulse, delay line, sync selector circuits, probes for CRO – active, passive, and attenuator type, triggered sweep CRO, and Delayed sweep, dual trace/beam CRO, Measurement of amplitude, frequency and phase (Lissajous method). Principles of sampling oscilloscope, storage oscilloscope, and digital storage oscilloscope, Digital frequency counters, time & Period measurements.

UNIT-III

Review of DC Bridges: Wheatstone bridge, Wein Bridge, errors and precautions in using bridges, AC bridges: Measurement of inductance-Maxwell's bridge, Anderson Bridge. Measurement of capacitance- Shearing Bridge, Kelvin Bridge, Q-meter, Interference and noise reduction techniques.

UNIT-IV

Signal generator-fixed and variable, AF oscillators, function generators, pulse, random noise, sweep, and arbitrary waveform generators, their standards, specifications and principles of working (Block diagram approach).Wave analyzers, Harmonic distortion analyzers, Spectrum analyzers, and Logic analyzers.

UNIT-V

Sensors and Transducers - Active and passive transducers: Measurement of displacement (Resistance, capacitance, inductance; LVDT) Force (strain gauges) Pressure (piezoelectric transducers) Temperature (resistance thermometers, thermocouples and thermistors), Velocity, Acceleration, Vibration, pH measurement Signal Conditioning Circuits.

Course Outcomes: *After the completion of the course the students will be able to*

a. *Understand basic principles involved in the meters for measuring voltage, current, resistance, frequency and so on.*
b. *Employ CRO for measuring voltage, current, resistance, frequency and so on.*
c. *Understand principles of measurements associated with different bridges.*
d. *Get complete knowledge regarding working of advanced instruments such as logic analyzers and spectrum analyzers.*

TEXT BOOKS:

1. A.D. Helfrick and W.D. Cooper, "Modern Electronic Instrumentation and Measurement Techniques", 5th Edition, PHI, 2002.
2. H.S.Kalsi, "Electronic Instrumentation", 2nd edition, Tata McGraw Hill, 2004.

REFERENCES:

1. David A. Bell, "Electronic Instrumentation & Measurements", 2nd Edition, PHI, 2003.
2. K. Lal Kishore, "Electronic Measurements & Instrumentations", Pearson Education, 2009.

III B.Tech I Semester

15AEC28 - ANTENNAS & WAVE PROPAGATION

L	T	P	C
3	1	0	3

Course Objectives:

1. *To introduce the fundamental principles of antenna theory and various types of antennas.*
2. *Applying the principles of antennas to the analysis, design, and measurements of antennas.*
3. *To know the applications of some basic and practical configurations such as dipoles, loops, and broadband, aperture type and horn antennas.*

UNIT - I

Antenna Basics & Dipole antennas: Introduction, Basic antenna parameters- patterns, Beam Area, Radiation Intensity, Beam Efficiency, Directivity-Gain-Resolution, Antenna Apertures, Effective height, Fields from oscillating dipole, Field Zones, Shape-Impedance considerations, Polarization – Linear, Elliptical, & Circular polarizations, Antenna temperature, Antenna impedance, Front–to-back ratio, Antenna theorems, Radiation – Basic Maxwell's equations, Retarded potential-Helmholtz Theorem, Radiation from Small Electric Dipole, Quarter wave Monopole and Half wave Dipole – Current Distributions, Field Components, Radiated power, Radiation Resistance, Beam width, Natural current distributions, far fields and patterns of Thin Linear Center-fed Antennas of different lengths, Illustrative problems.

UNIT- II

VHF, UHF and Microwave Antennas - I: Loop Antennas - Introduction, Small Loop, Comparison of far fields of small loop and short dipole, Radiation Resistances and Directives of small and large loops (Qualitative Treatment), Arrays with Parasitic Elements - Yagi - Uda Arrays, Folded Dipoles & their characteristics. Helical Antennas-Helical Geometry, Helix modes, Practical Design considerations for Monofilar Helical Antenna in Axial and Normal Modes. Horn Antennas- Types, Fermat's Principle, Optimum Horns, Design considerations of Pyramidal Horns, Illustrative Problems.

UNIT - III

VHF, UHF and Microwave Antennas - II: Micro strip Antennas- Introduction, features, advantages and limitations, Rectangular patch antennas- Geometry and parameters, characteristics of Micro strip antennas, Impact of different parameters on characteristics, reflector antennas - Introduction, Flat sheet and corner reflectors, parabola reflectors- geometry, pattern characteristics, Feed Methods, Reflector Types - Related Features, Lens Antennas - Geometry of Non-metallic Dielectric Lenses, Zoning , Tolerances, Applications, Illustrative Problems.

UNIT- IV

Antenna Arrays & Measurements: Point sources - Definition, Patterns, arrays of 2 Isotropic sources- Different cases, Principle of Pattern Multiplication, Uniform Linear Arrays – Broadside

Arrays, Endfire Arrays, EFA with Increased Directivity, Derivation of their characteristics and comparison, BSAa with Non-uniform Amplitude Distributions - General considerations and Bionomial Arrays, Illustrative problems.

Antenna Measurements: Introduction, Concepts- Reciprocity, Near and Far Fields, Coordination system, sources of errors, Patterns to be Measured, Pattern Measurement Arrangement, Directivity Measurement , Gain Measurements (by comparison, Absolute and 3-Antenna Methods).

UNIT - V

Wave Propagation: Introduction, Definitions, Characterizations and general classifications, different modes of wave propagation, Ray/Mode concepts, Ground wave propagation (Qualitative treatment) - Introduction, Plane earth reflections, Space and surface waves, wave tilt, curved earth reflections, Space wave propagation - Introduction, field strength variation with distance and height, effect of earth's curvature, absorption, Super refraction, M-curves and duct propagation, scattering phenomena, tropospheric propagation, fading and path loss calculations, Sky wave propagation - Introduction, structure of Ionosphere, refraction and reflection of sky waves by Ionosphere, Ray path, Critical frequency, MUF, LUF, OF, Virtual height and Skip distance, Relation between MUF and Skip distance, Multi-HOP propagation, Energy loss in Ionosphere, Summary of Wave Characteristics in different frequency ranges, Illustrative problems.

Course Outcomes:

Through lecture, and out-of-class assignments, students are provided learning experiences that enable them to:

a. *Understand the basic principles of all types of antennas and*
b. *Analyze different types of antennas designed for various frequency ranges.*
c. *Become proficient with analytical skills for understanding practical antennas.*
d. *Design some practical antennas such as dipole, Yagi-uda, and horn antennas.*
e. *Determine the radiation patterns (in principal planes) of antennas through measurement setups.*
f. *Develop technical & writing skills important for effective communication.*
g. *Acquire team-work skills for working effectively in groups.*

TEXT BOOKS:

1. John D. Kraus and Ronald J. Marhefka and Ahmad S.Khan, "Antennas and wave propagation," TMH, New Delhi, 4th Ed., (special Indian Edition), 2010.
2. C.A. Balanis, "Antenna Theory- Analysis and Design," John Wiley & Sons, 2nd Edn., 2001.

REFERENCES:

1. E.C. Jordan and K.G. Balmain, "Electromagnetic Waves and Radiating Systems," 2nd Edition, PHI, 2000.
2. K.D. Prasad, SatyaPrakashan, "Antennas and Wave Propagation," New Delhi, Tech. India Publications, 2001.

III B.Tech I Semester

15AEC29 - ANALOG COMMUNICATION SYSTEMS LAB

L	T	P	C
0	0	3	2

Course Objectives:

1. To provide a real time experience for different analog modulation systems and demodulation schemes
2. To provide exposure to the real time behavior of different elements available in analog communication system such as filters, amplifiers etc
3. To perform radio receiver measurements and antenna measurements

List of Experiments: (All Experiments are to be conducted)

1. Amplitude modulation and demodulation.
2. Frequency modulation and demodulation.
3. Characteristics of Mixer.
4. Pre-emphasis & de-emphasis.
5. Pulse amplitude modulation & demodulation.
6. Pulse width modulation & demodulation
7. Pulse position modulation & demodulation.
8. Radio receiver measurements – sensitivity, selectivity and fidelity.
9. Measurement of half power beam width (HPBW) and gain of a half wave dipole antenna.
10. Measurement of radiation pattern of a loop antenna in principal planes.

Equipment required for the Laboratory:

1. Regulated Power Supply : 0 – 30 V
2. CROs: 0 – 20 M Hz.
3. Function Generators: 0 – 3 M Hz
4. RF Signal Generators: 0 – 1000 M Hz
5. Multimeters
6. Required electronic components (active and passive) for the design of experiments from 1-7
7. Radio Receiver Demo kits or Trainers.
8. RF power meter frequency range: 0 – 1000 MHz
9. Spectrum Analyzer
10. Dipole antennas (2 Nos.): 850 MHz – 1GHz
11. Loop antenna (1 no.): 850 MHz – 1GHz
12. Bread Boards

Course Outcomes: After completion of the course the students will be able

To experience real time behavior of different analog modulation schemes

a. Technically visualize spectra of different analog modulation schemes
b. Analyze practical behavior of different elements available in analog communication system such as filters, amplifiers etc.
c. Measure characteristics of radio receiver and antenna measurements.

III B.Tech I Semester

15AEC30 - IC APPLICATIONS LAB

L	T	P	C
0	0	3	2

Note: The students are required to perform any Six Experiments from each Part of the following.

PART A: LINEAR IC APPLICATIONS

Course Objectives:

1. *To verify the applications of Op-amp*
2. *To verify applications IC555, IC565 and IC566*
3. *To use computer-aided design tools for development of complex digital logic circuits*
4. *To model, simulate, verify, analyze, and synthesize with hardware description languages*
5. *To design and prototype with standard cell technology and programmable logic*
6. *To design tests for digital logic circuits and design for testability*

List of Experiments: (using Hardware)

1. Study the characteristics of negative feedback amplifier
2. Design of an Instrumentation amplifier
3. Study the characteristics of regenerative feedback system with extension to design an astablemultivibrator
4. Study the characteristics of integrator circuit
5. Design of Analog filters (2nd order bandpass filter and Notch filter)
6. Design of a function generator
7. Design of a Voltage Controlled Oscillator (VCO)
8. Design of a Phase Locked Loop (PLL)

Equipment required for Laboratories:

1. RPS
2. CRO
3. Function Generator
4. Multi Meters
5. ASLK Pro trainer kit
6. Analog IC Tester

Course Outcomes:

a. *Able to verify applications of Op-amp*
b. *Able to verify applications of IC555 and IC566*
c. *Able to use computer-aided design tools for development of complex digital logic circuits.*
d. *Able to model, simulate, verify, analyze, and synthesize with hardware description languages.*
e. *Able to design and prototype with standard cell technology and programmable logic.*
f. *Able to design tests for digital logic circuits, and design for testability.*

III B.Tech I Semester

15AEC30 - IC APPLICATIONS LAB

L	T	P	C
0	0	3	2

PART-B: DIGITAL IC APPLICATIONS

Course Objectives:

1. *To design and draw the internal structure of the various digital integrated circuits*
2. *To develop VHDL source code, perform simulation using relevant simulator and analyze the obtained simulation results using necessary synthesizer.*
3. *To verify the logical operations of the digital IC's (Hardware) in the laboratory.*

List of Experiments: (using Software)

1. Realization of Logic Gates.
2. 4 to 8 Decoder- 74138.
3. 8 x 1 Multiplexer-74151 and 2 x 4 De-multiplexer-74155.
4. 4-Bit Comparator-7485.
5. D Flip-Flop-7474.
6. Decade counter-7490.
7. Shift registers-7495.
8. ALU Design.

Equipment Required:

1. Xilinx ISE Software.
2. Personal Computers.

Course Outcomes: *After completion of the course, the students is able to*

a *Design and draw the internal structure of the various digital integrated circuits*

b *Develop VHDL source code, perform simulation using relevant simulator and analyze the obtained simulation results using necessary synthesizer.*

c *Verify the logical operations of the digital IC's (Hardware) in the laboratory*

III B.Tech I Semester

15AHS06 - ADVANCED ENGLISH LANGUAGE COMMUNICATION SKILLS LAB

(Common for ME, ECE and CSE)

L	T	P	C
0	0	3	0

1. INTRODUCTION

The introduction of the Advanced Communication Skills Lab is considered essential at 3rd year level. At this stage, the students need to prepare themselves for their careers which may require them to listen to, read, speak and write in English both for their professional and interpersonal communication in the globalised context.

The proposed course should be a laboratory course to enable students to use 'good' English and perform the following:

- Gathering ideas and information to organize ideas relevantly and coherently.
- Engaging in debates.
- Participating in group discussions.
- Facing interviews.
- Writing project/research reports/technical reports.
- Making oral presentations.
- Writing formal letters.
- Transferring information from non-verbal to verbal texts and vice-versa.
- Taking part in social and professional communication.

2. OBJECTIVES:

This Lab focuses on using multi-media instruction for language development to meet the following targets:

- To improve the students' fluency in English, through a well-developed vocabulary and enable them to listen to English spoken at normal conversational speed by educated English speakers and respond appropriately in different socio-cultural and professional contexts.
- Further, they would be required to communicate their ideas relevantly and coherently in writing.
- To prepare all the students for their placements.

3. SYLLABUS: The following course content to conduct the activities is prescribed for the Advanced Communication Skills (ACS) Lab:

UNIT-I: COMMUNICATIVE COMPETENCY

1. Reading Comprehension – Techniques-Book Review
2. Listening comprehension – Video Talks-Eminent speeches
3. Verbal Competency - Vocabulary - Spotting Errors- Aptitude Tests

UNIT-II: TECHNICAL WRITING

1. Essentials of writing -Technical Paper/ Report writing-Concise writing
2. Administrative / Business Documentation – Circular Writing -Meeting – Agenda – Minutes-Resolutions

3. Project Writing – Framing Outline – Finding Problem- Documentation-Citation

UNIT-III: PRESENTATIONAL SKILLS

1. Oral presentations – Public Speaking –Paper & Seminar Presentation
2. Digital Presentations -Power point - Video Presentation -Poster presentation
3. Stage Dynamics – Body Language – Para Language

UNIT-IV: CORPORATE SKILLS

1. Etiquettes -Dress - Dining – Net Etiquettes
2. Telephonic skills –Mobile Etiquettes
3. Soft Skills – Intra – Inter Personal Skills

UNIT-V: GETTING READY FOR JOB

1. Before Interview -Curriculum vitae/ Resume-Covering letter-E-mail writing
2. During Interview – G.D-Mock Interviews– Psychometric Tests – Follow up
3. After interview - Excelling in Profession– Team spirit– Work culture

4. LEARNING OUTCOMES:

- Acquiring extensive range of vocabulary and its proper use contextually
- Flair in Writing and felicity in written expression.
- Enhanced job prospects / Employability skills /developing organizational abilities in tune with corporate requirement
- Effective Speaking Abilities

5. MINIMUM REQUIREMENT:

The Advanced Communication Skills (ACS) Laboratory shall have the following infra-structural facilities to accommodate at least 35 students in the lab:

- Spacious room with appropriate acoustics.
- Round Tables with movable chairs
- Audio-visual aids /LCD Projector
- Public Address system
- P – IV Processor, Hard Disk – 80 GB, RAM–512 MB Minimum, Speed – 2.8 GHZ
- T. V, a digital stereo & Camcorder
- Headphones of High quality

6. SUGGESTED SOFTWARE:

The software consisting of the prescribed topics elaborated above should be procured and used.

1. K-VAN SOLUTIONS-Advanced communication lab
2. DELTA's key to the Next Generation TOEFL Test: Advanced Skill Practice.
3. TOEFL & GRE(KAPLAN, AARCO & BARRONS, USA, Cracking GRE by CLIFFS)
4. Train2success.com

7. BOOKS RECOMMENDED:

1. Objective English for Competitive Exams, HariMohana Prasad, 4th edition, Tata McGraw Hill.
2. Effective Technical Communication, AshrifRizvi, TataMcGrahill, 2011.

3. Technical Communication, Meenakshi Raman &Sangeeta Sharma, O U Press 2009.
4. Books on TOEFL/GRE/GMAT/CAT/IELTS, Barron's/DELTA/Cambridge University Press.2012.
5. Soft Skills for Everyone, Butterfield Jeff, Cengage Publications, 2011.
6. Ultimate Psychometric Tests: Mike Bryon,VinodVasishtha for Kogan Page India Pvt. Ltd, New Delhi.
7. Soft Skills- Know Yourself And Know The World, Dr.K.Alex, Chand Publications ,Third revised edition 2014.
8. Management Shapers Series , Universities Press (India) Pvt Ltd., Himayatnagar, Hyderabad 2008.
9. Word Power Made Handy, ShaliniVerma, S Chand Publications, 2011.

III B.Tech II Semester

15AHS07 - MANAGEMENT SCIENCE

L	T	P	C
3	1	0	3

COURSE OBJECTIVES:

- *To analyze the characteristics and contributions of enterprising people*
- *To assess their own entrepreneurial and enterprising potential To develop an understanding of the general role of Small Business Enterprises*
- *To develop skills to start, run and manage SMEs*
- *Understand the role of entrepreneurship in economic development.*
- *Identify the general characteristics of entrepreneurs.*
- *Know the differences between entrepreneurial and managerial type jobs.*
- *Understand the significance and sources of capital. Participate in the preparation of a complete business plan.*
- *Have an understanding of individual personalities and interpersonal skills needed for effective communications in a diverse business environment.*

UNIT I

INTRODUCTION TO MANAGEMENT:

Concepts of Management Nature - importance and Functions of Management, Taylor's Scientific Management Theory, Fayol's Principles of Management, Maslow's Theory of Human Needs, Douglas McGregor's Theory X and Theory Y, Leadership Styles, Social responsibilities of Management.

DESIGNING ORGANIZATIONAL STRUCTURES:

Basic concepts related to Organisation - Departmentation and Decentralization, Types of mechanistic and organic structures of organization (Line organization, Line and staff organization, functional organization, Committee organization, matrix organization, team structure) their merits, demerits and suitability.

UNIT II

OPERATIONS MANAGEMENT:

Principles and Types of Plant Layout-Methods of production (Job, batch and Mass Production), Work Study. Statistical Quality Control:*c*chart, *p* chart, (simple Problems) Deming's contribution to quality.

MATERIALS MANAGEMENT: EOQ, ABC Analysis, Purchase Procedure and Stores Management. Inventory — functions. Types, inventory classification techniques.

Marketing: Functions of Marketing, Marketing Mix, and Marketing Strategies based on Product Life Cycle, Channels of distribution.

UNIT III

HUMAN RESOURCES MANAGEMENT (HRM):

Concepts of HRM ,Personnel Management and Industrial Relations (PMIR), Basic functions of HR Manager: Manpower planning, Recruitment, Selection, Training and Development, Placement, Wage and Salary Administration, Promotion, Transfer, Separation, Performance Appraisal, Grievance Handling and Welfare Administration, Job Evaluation, Merit Rating and methods.

UNIT IV

STRATEGIC MANAGEMENT:

Vision, Mission, Goals, Objectives, Policy, Strategy, Programmes, Elements of Corporate Planning Process, Environmental Scanning, Value Chain Analysis, SWOT Analysis, Steps in Strategy Formulation and Implementation, Generic Strategy alternatives.

PROJECT MANAGEMENT (PERT/CPM):

Network Analysis, Programme Evaluation and Review Technique (PERT), Critical Path Method (CPM), Identifying critical path, Probability of Completing the project within given time, Project Cost Analysis, Project Crashing. (Simple problems).

UNIT V

CONTEMPORARY MANAGEMENT PRACTICES:

Basic concepts of MIS, Materials Requirement Planning (MRP), Just-In-Time (JIT) System, Total Quality Management (TQM), Six sigma concept, Supply Chain Management, Enterprise Resource Planning (ERP), Performance Management, Business Process outsourcing (BPO), Business Process Re-engineering and Bench Marking, Balanced Score Card.

Assignments, case studies and mini project.

LEARNING OUTCOMES

- *Equipping engineers for a lifelong career addressing the critical technical and managerial needs of private and public organizations.*
- *Exploring and developing analytic abilities, making better decisions, developing and executing strategies while also leading people who innovate.*
- *Cultivating the technical skills as well as the behavioral challenges of running organizations and complex systems.*
- *Emphasizing quantitative analytic skills and an entrepreneurial spirit*
- *Have an introductory understanding of global entrepreneurship concepts.*
- *Understand the concept & process of entrepreneurship- its contribution & role in the growth & development of individual & the nation.*

TEXT BOOKS:

1. Management Science,Aryasri: TMH, 2004.
2. Management ,Stoner, Freeman, Gilbert, , 6th Ed, Pearson Education,New Delhi, 2004.

REFERENCES:

1. Marketing Mangement ,Kotler Philip & Keller Kevin Lane: 12/e, PHI,2005.
2. Essentials of Management ,Koontz&Weihrich:, 6/e, TMH, 2005.
3. Management—Principles and Guidelines, Thomas N.Duening& John M.Biztantra, 2003.
4. Production and Operations Management, KanishkaBedi, Oxford University Press, 2004.
5. Personnel Management, Memoria&S.V.Gauker, , Himalaya, 25/e, 2005
6. Modern Management ,Samuel C.Certo:, 9/e, PHI, 2005
7. Business Policy and Strategic Management, Lawrence R Jauch, R.Gupta&William F.Frank Bros., 2005.

III B.Tech II Semester

15AEC31 - DIGITAL COMMUNICATION SYSTEMS

L	T	P	C
3	1	0	3

Course Objectives:

1. *The students to be able to understand, analyze, and design fundamental digital communication systems.*
2. *To know various coding techniques such as source coding, line coding, and channel coding.*
3. *To understand various digital modulation techniques and their applications.*
4. *The course focuses on developing a thorough understanding of digital communication systems by using a series of specific examples and problems.*

UNIT – I

Source Coding Systems: Introduction, sampling process, quantization, quantization noise,conditions for optimality of quantizers, encoding, Pulse-Code Modulation (PCM), Line codes, Differential encoding, Regeneration, Decoding & Filtering, Noise considerations in PCM systems, Time-Division Multiplexing (TDM), Synchronization, Delta modulation (DM), Differential PCM (DPCM), Processing gain, Adaptive DPCM (ADPCM), Comparison of the above systems.

UNIT – II

Baseband Pulse Transmission: Introduction, Matched filter receiver, Properties of Matched filter,Matched filter for rectangular pulse, Error rate due to noise, Inter-symbol Interference (ISI) and its mitigation, Nyquist criterion for distortion less baseband binary transmission, ideal Nyquist channel, Raised cosine filter & its spectrum, Correlative coding – Duo binary & Modified duo binary signaling schemes, Partial response signaling, Baseband M-array PAM transmission, Eye diagrams.

UNIT – III

Signal Space Analysis: Introduction, Geometric representation of signals, Gram-Schmidtorthogonalization procedure, Conversion of the Continuous AWGN channel into a vector channel, Coherent detection of signals in noise, Correlation receiver, Equivalence of correlation and Matched filter receivers, Probability of error, Signal constellation diagram.

UNIT – IV

Digital Modulation Techniques: Types of digital modulation, wave forms for amplitude, frequency and phase shift keying. Method of generation and detection of coherent & non-coherent binary ASK, FSK & PSK, differential phase shift keying, Quadrature modulation techniques (QAM, QPSK and MSK), Signal to Noise Ratio (SNR) and Bit Error Rate (BER) for digital modulation.M-array PSK, M-array quadrature amplitude modulation (M-array QAM), Comparison of power bandwidth requirements for all the above schemes.

UNIT – V

Channel Coding: Error Detection & Correction - Repetition & Parity Check Codes,Interleaving, Code Vectors and Hamming Distance, Timing and Frequency Synchronization, Forward Error Correction (FEC) Systems, Automatic Retransmission Query (ARQ) Systems, Linear Block Codes – Matrix Representation of Block Codes, Convolutional Codes – Convolution Encoding, Decoding Methods and Maximum Likelihood(ML) decoding and Maximum a Posteriori(MAP) decoding., Basics of MultipleAccessTechniques (TDMA,FDMA and CDMA)

***Course Outcomes**: At the end of the course, the students should be able to:*

a. *Able to understand basic sapling and quantization techniques and source coding systems.*
b. *Know the difference between source coding, channel coding, and line coding techniques and apply their concepts in the analysis and design of digital communication systems.*
c. *Able to explain generation and detection of various digital modulation techniques.*
d. *Understand the basic principles of baseband and pass band digital modulation schemes.*
e. *Analyze probability of error performance of digital systems and are able to design digital communication systems.*
f. *Understand the basics of information theory and error correcting codes.*

TEXT BOOKS:

1. Simon Haykin, "Analog Communication Systems," 4th Edition, Wiley India Edition, 2011
2. Bernard Sklar, "Digital Communications", 2nd edition, Prentice-Hall PTR, 2001.

REFERENCES:

1. J. G. Proakis, M Salehi, Gerhard Bauch, "Modern Communication Systems Using MATLAB," 3rd Edition, CENGAGE, 2013.
2. A. Bruce Carlson, & Paul B. Crilly, "Communication Systems – An Introduction to Signals & Noise in Electrical Communication", 5th Edition, McGraw-Hill International Edition, 2010.

III B.Tech II Semester

15AEC32-MICROPROCESSORS & MICROCONTROLLERS

(Common for EEE and ECE)

L	T	P	C
3	1	0	3

Course Objectives: *This subject deals about the basic 16-bit (8086) processor and an 8-bit (8051) controllers, their architecture, internal organization and their functions, interfacing an external device with the processors/ controllers.*

UNIT-I: Introduction

Microprocessor based personal computer system, 8085 Micro Processors: Architecture, Register Organizing, Addressing modes, interrupts, Instruction set, Bus Timings, T state Calculations.
8086 Micro Processors: Programmer's model for 8086, memory organization of 8086, Addressing modes, Instruction set of 8086, Assembly language programming.

UNIT- II: Interfacing with 8086 –Part 1

Pin diagram detail of 8086, Minimum and Maximum mode of operations, Bus timing, Memory interface to 8086, DMA Controller: 8257 and 8237 their interfacing to 8086.

UNIT-III: Interfacing with 8086 – Part 2

Parallel and serial data transfer methods, I/O interface method, 8255 PPI chip, Interfacing with 7 segment LEDs, Interfacing with keyboards, Interfacing with ADCs, Interfacing with DACs, Interfacing with Stepper Motor.

UNIT-IV: Interfacing with 8086 – Part 3

Interrupts of 8086, Programming with DOS and BIOS function calls, 8259 interrupt controller and its interfacing with 8086, cascade mode of operation of 8259.

UNIT–V: Introduction to Microcontrollers

8051 Micro Controllers: Architecture, Registers Organization, Memory Organization, Pin Description, Connections, I/O Ports, Timers and their modes of operations, Serial Communication, Addressing Modes, Instruction Set, Assembly directives, Simple assembly software programs with 8051, Interfacing:LEDs, LCDs and switches.

Course Outcomes: *Students can able to*

a. *Recall and apply a basic concept of digital fundamentals to Microprocessor based personal computer system.*
b. *Understand architecture and working of basic microprocessor and Microcontrollers.*
c. *Understand the detailed s/w & h/w structure of the Microprocessor.*
d. *Illustrate how the different peripherals (8255, 8253 etc.) are interfaced with Microprocessor.*
e. *Write Assembly level language programming for basic microprocessor and microcontrollers.*
f. *Analyze the data transfer process through serial & parallel ports.*

TEXT BOOKS:

1. Ramesh Gaonkar, "Microprocessor Architecture, Programming and Applications with the 8085," 6th Edition, Penram International Publishing, 2013
2. Douglas V Hall, S. S. SP Rao, "Microprocessors and Interfacing," 3rd Edition, Tata McGraw Hill, 2012.
3. M.A. Mazidi& J.C. Mazidi Microcontroller and Embedded systems using Assembly & C, 2nd Edition, Pearson Education, 2007.

REFERENCES:

1. A.K.Ray, K.M.Bhurchandi, "Advanced Microprocessors and Peripherals," 3rd Edition, Tata McGraw Hill, 2006.
2. Kenneth J Ayala, "The 8051 Microcontroller," 3rd Edition, Thomson Delmar Learning, 2004.

III B.Tech II Semester

15AEC33 - DIGITAL SIGNAL PROCESSING

L	T	P	C
3	1	0	3

Course Objectives:

1. *To use Z transforms and discrete time Fourier transforms to analyze a digital system.*
2. *To design and analyze simple finite impulse response filters*
3. *To understand stability of FIR filters*
4. *To know various structures used in the implementation of FIR and IIR filters*
5. *Window method design structure for implementation.*

UNIT-I

Introduction: Review of discrete-time signals and systems–Time domain analysis of discrete-time signals & systems, Frequency domain analysis of discrete-time signals and systems.

Discrete Fourier Transform: Frequency-domain sampling and reconstruction of discrete-time signals, Discrete Fourier Transform (DFT), The DFT as a linear transformation, Relationship of the DFT to other transforms, Properties of DFT, Linear filtering methods based on DFT, Frequency analysis of signals using the DFT.

UNIT-II

Fast Fourier Transform Algorithms (FFTA): Fast Fourier transforms (FFT)-Radix2 decimation in time and decimation in frequency FFT algorithms, inverse FFT and FFT for composite N, Applications of FFT algorithms – Efficient computation of the DFT of two real sequences, 2N point real sequences, Use of the FFT algorithm in linear filtering and correlation, Quantization errors in the computation of DFT.

UNIT-III

Implementation of Discrete-Time Systems: Overview of Z-transform, Structures for IIR systems – Direct form, Signal flow graphs & Transposed, Cascade form, Parallel form and Lattice structures, Conversion from Lattice structure to direct form, lattice –Ladder structure. Structures for the realization of discrete-time systems, Structures for FIR systems - Direct form, Cascade form, Frequency sampling, and Lattice structures

UNIT-IV

Design of Digital Filters: General considerations–Causality and its implications, Characteristics of practical Frequency Selective Filters,

Design of IIR filters from analog filters–IIR filter design: approximation of derivatives, Impulse invariance method and bilinear transformation method, Frequency transformation in the analog and digital domains, Illustrative problems.

Design of FIR filters–Symmetric and asymmetric FIR filters, Design of linear phase FIR filters: using windows, using frequency sampling method.

UNIT-V

Multirate Digital Signal Processing: Introduction, Decimation, and interpolation, Sampling rate conversion by a rational factor, Implementation of sampling rate conversion, Multistage implementation of sampling rate conversion, Sampling rate conversion of bandpass signals, Sampling rate conversion by arbitrary factor, Applications of multirate signal processing.

***Course Outcomes**: At the end of the course, the student should be able to*

- *a Understand of various signals and systems using Discrete Fourier Transform (DFT).*
- *b Explain various algorithms using Fast Fourier Transforms (FFT).*
- *c Implement IIR and FIR Digital Filter Structures using different methods.*
- *d Design IIR and FIR digital filter using various methods*
- *e Understand Multirate Digital Signal Processing with Interpolation and Decimation methods.*
- *f Explain various applications of Multirate Signal Processing*

TEXT BOOKS:

1. John G. Proakis, Dimitris G. Manolakis, "Digital signal processing, principles, Algorithms and applications," 4th Edition, Pearson Education, 2007.
2. P.RameshBabu, Digital Signal Processing, 4th Edition, SciTech Publishing, 2012.

REFERENCES:

1. Sanjit K Mitra, "Digital Signal Processing, A computer base approach," 3rd Edition, Tata McGraw Hill, 2009.
2. A. Anand Kumar, "Digital Signal Processing," 2nd Edition, PHI Learning, 2011

III B.Tech II Semester

15AEC37 - MICROPROCESSORS & MICROCONTROLLERS LAB

L	T	P	C
0	0	3	2

Course Objectives:

1. *To become skilled in 8086 Assembly Language programming.*
2. *To understand programmable peripheral devices and their Interfacing.*
3. *To understand and learn 8051 microcontroller.*
4. *To learn 8051 assembly Language programming*

Minimum Ten Experiments to be conducted (Five from each section)

I) 8086 Microprocessor Programs using MASM/8086 kit.

1. Introduction to MASM Programming.
2. Arithmetic operation – Multi byte Addition and Subtraction, Multiplication and Division – Signed and unsigned Arithmetic operation, ASCII – arithmetic operation.
3. Logic operations – Shift and rotate – Converting packed BCD to unpacked BCD, BCD to ASCII conversion.
4. By using string operation and Instruction prefix: Move Block, Reverse string, Sorting, Length of the string, String comparison.

Interfacing:

5. 8259 – Interrupt Controller and its interfacing programs
6. A /D Interfacing
7. D /A Interfacing
8. Stepper Motor.

II) Microcontroller 8051 Trainer kit

1. Arithmetic operation – Multi byte Addition and Subtraction, Multiplication and Division – Signed and unsigned Arithmetic operation.
2. Logic operations – Shift and rotate.
3. Sorting- Ascending and descending order.

Interfacing using 8051 Trainer kit:

4. A/D Interfacing
5. D /A Interfacing
6. Switch Interfacing
7. Relay Interfacing

Course Outcomes:

a. *Able to write8086 Assembly Language programs.*
b. *Able to understand programmable peripheral devices and their Interfacing.*
c. *Able to write 8051 assembly Language programs.*

III B.Tech II Semester

15AEC38 - DIGITAL COMMUNICATION SYSTEMS LAB

L	T	P	C
0	0	3	2

Course Objectives:

1. To provide a real time experience for different digital modulation and demodulation schemes

Minimum of Ten experiments to be conducted (Five from each Part-A & B)

PART-A: HARDWARE EXPERIMENTS

1. Sampling Theorem – verification.
2. Time division multiplexing.
3. Pulse code modulation.
4. Differential pulse code modulation.
5. Delta modulation.
6. Frequency shift keying.
7. Differential phase shift keying.
8. QPSK modulation and demodulation.

PART-B: SOFTWARE EXPERIMENTS

(Modeling of Digital Communications using MATLAB)

1. Sampling Theorem – verification.
2. Pulse code modulation.
3. Differential pulse code modulation.
4. Delta modulation.
5. Frequency shift keying.
6. Phase shift keying.
7. Differential phase shift keying.
8. QPSK modulation and demodulation.

Equipment required for Laboratories:

1. RPS - 0 – 30 V
2. CROs - 0 – 20 M Hz.
3. Function Generators - 0 – 1 M Hz
4. RF Generators (3 Nos.) - 0 – 1000 M Hz.
5. Multimeters
6. Lab Experimental kit for Pulse Code Modulation (Experiment No.3 of part – A)
7. Required Electronic Components (Active and Passive) which include required ICs
8. Arbitrary Wave form generators/ PNS generators – 2 Nos. (to generate digital data at required data rates)
9. Licensed MATLAB software for 30 users with required tool boxes.

Course Outcomes: After completion of the course the students will be able

a. To experience real time behavior of different digital modulation schemes and technically visualize spectra of different digital modulation schemes

IV B.Tech I Semester

15AEC51 - MICROWAVE ENGINEERING

L	T	P	C
3	1	0	3

Course Objectives:

1. *To analyze micro-wave circuits incorporating hollow, dielectric and planar waveguides, transmission lines, filters and other passive components, active devices.*
2. *To Use S-parameter terminology to describe circuits.*
3. *To explain how microwave devices and circuits are characterized in terms of their "S" Parameters.*
4. *To give students an understanding of microwave transmission lines.*
5. *To Use microwave components such as isolators, Couplers, Circulators, Tees, Gyrators etc..*
6. *To give students an understanding of basic microwave devices (both amplifiers and oscillators).*
7. *To expose the students to the basic methods of microwave measurements.*

UNIT-I

Waveguides & Resonators: Introduction, Microwave spectrum and bands, applications of Microwaves, Rectangular Waveguides-Solution of Wave Equation in Rectangular Coordinates, TE/TM mode analysis, Expressions for fields, Cutoff frequencies, filter characteristics, dominant and degenerate modes, sketches of TE and TM mode fields in the cross-section, Mode characteristics - Phase and Group velocities, wavelengths and impedance relations, Circular Waveguides - Dominant mode (qualitative treatment only), Rectangular Waveguides – Power Transmission and Power Losses, Impossibility of TEM Modes, losses, Q-factor, Cavity resonators-introduction, Rectangular and cylindrical cavities, dominant modes and resonant frequencies, Q-factor and coupling coefficients, Illustrative Problems.

UNIT-II

Waveguide Components: Scattering Matrix - Significance, Formulation and properties, Coupling mechanisms - Probe, Loop, Aperture types, Wave guide discontinuities - waveguide Windows, tuning screws and posts, matched loads, Waveguide attenuators - Resistive card, rotary vane Attenuators, waveguide phase shifters-dielectric, rotary vane phase shifters, Wave guide multiport junctions - E plane and H plane Tees, Magic Tee, Directional couplers-2 hole, Bothe hole types, Ferrites-composition and characteristics, Faraday rotation, Ferrite components - Gyrator, Isolator, Circulator, S Matrix calculations for 2-port junction, E plane and H plane Tees, Magic Tee, Directional coupler, circulator and Isolator, Illustrative Problems.

UNIT-III

Linear beam Tubes: Limitations and losses of conventional tubes at microwave frequencies, Classification of Microwave tubes, O type tubes - 2 cavity klystrons-structure, Reentrant cavities, velocity modulation process and Applegate diagram, bunching process and small signal theory-Expressions for o/p power and efficiency, Reflex Klystrons-structure, Velocity Modulation, Applegate diagram, mathematical theory of bunching, power output, efficiency, oscillating modes and o/p characteristics, Effect of Repeller Voltage on Power o/p, Significance, types and characteristics of slow wave structures, structure of TWT and amplification process (qualitative treatment), Suppression of oscillations, Gain considerations.

UNIT - IV

Cross-field Tubes & Microwave Semiconductor Devices: Introduction, Cross field effects, Magnetrons-different types, cylindrical travelling wave magnetron-Hull cutoff and Hartree conditions, modes of resonance and PI-mode operation, separation of PI-mode, O/P characteristics, Introduction to Microwave semiconductor devices, classification, applications, Transfer Electronic Devices, Gunn diode - principles, RWH theory, Characteristics, Basic modes of operation - Gunn oscillation modes, LSA Mode, Varactor diode, Parametric amplifier, Introduction to Avalanche Transit time devices (brief treatment only), Illustrative Problems.

UNIT-V

Microwave Measurements: Description of Microwave bench-different blocks and their features, errors and precautions, Microwave power measurements, Measurement of attenuation, frequency, VSWR (low, medium, high), Measurement of 'Q' of a cavity, Impedance measurements.

Course Outcomes*: At the end of the semester, students are provided learning experiences that enable them to:*

a. Analyze micro-wave circuits incorporating hollow, dielectric and planar waveguides, transmission lines, filters and other passive components, active devices.

b. Understand the various principles involved in various Microwave oscillators and amplifiers such as Klystron tubes, TWTs, Magnetrons, Gunn diode etc.

c. Use S-parameter terminology & to describe the characteristics of microwave circuits through scattering parameters.

d. Ability to understanding of microwave transmission lines and how to use microwave components such as isolators, Couplers, Circulators, Tees, Gyrators etc.

e. Set up the microwave benches for measurement of various parameters such as microwave frequency, VSWR, Impedance of unknown load etc.

f. Verify the characteristics of Microwave devices through measurements.

TEXT BOOKS:

1. Samuel Y. Liao, "Microwave devices and circuits," 3rd Edition, Pearson Publishing, 2003.
2. Herbert J. Reich, J. G. Skalnik, P. F. Ordung and H. L. Krauss, "Microwave principles," CBS publishers and distributors, New Delhi, 2004.

REFERENCES:

1. R. E. Collin, "Foundations for microwave engineering," 2nd Edition, John Wiley, 2002.
2. Om. P. Gandhi, "Microwave Engineering and Applications," Pergamon, 1981.

IV B.Tech I Semester

15AEC52 - OPTICAL FIBRE COMMUNICATIONS

L	T	P	C
3	1	0	3

Course Objectives:

1. *To learn the basic concepts of fibre optics communications.*
2. *To make the students learn the system with various components or process for various applications.*
3. *To enlighten the student with latest trends in optical communications.*

UNIT-I

Introduction to Optical Fibers: Evolution of fiber optic system- Element of an Optical Fiber Transmission link- Ray Optics-Optical Fiber Modes and Configurations –Mode theory of Circular Wave guides- Overview of Modes-Key Modal concepts- Linearly Polarized Modes – Single Mode Fibers-Graded Index fiber structure.

UNIT-II

Signal Degradation Optical Fibers: Attenuation – Absorption losses, Scattering losses, Bending Losses, Core and Cladding losses, Signal Distortion in Optical Wave guides - Information Capacity determination –Group Delay- Material Dispersion, Wave guide Dispersion, Signal distortion in SM fibers-Polarization Mode dispersion, Intermodal dispersion, Pulse Broadening in GI fibers-Mode Coupling –Design Optimization of SM fibers-RI profile and cut-off wavelength.

UNIT-III

Fiber Optical Sources and Coupling : Direct and indirect Band gap materials-LED structures – Light source materials –Quantum efficiency and LED power, Modulation of a LED, lasers Diodes-Modes and Threshold condition –Rate equations –External Quantum efficiency – Resonant frequencies –Temperature effects, Introduction to Quantum laser, source-to-fiber Power Launching, Lensing schemes, Fibre –to- Fibre joints, Fibre splicing.

UNIT-IV

Fiber Optical Receivers : PIN and APD diodes –Photo detector noise, SNR, Detector Response time, Avalanche Multiplication Noise –Comparison of Photo detectors –Fundamental Receiver Operation – preamplifiers, Error Sources –Receiver Configuration –Probability of Error – Quantum Limit.

UNIT-V

System Design and Applications: Design of Analog Systems: system specification, power budget, bandwidth budget

Design of Digital Systems: system specification, rise time budget, power budget, Receiver sensitivity, Overview of WDM.

Applications: Telephony, Telemetry, video distribution, military applications, passive and active sensing.

Course Outcomes: *The students can able*

a. To demonstrate the ability to design a system, component or process as per needs and specification.

b. To learn about SONET/SDH and its application.

TEXT BOOKS:

1. Gerd Keiser, "Optical Fiber Communication," 3rd Edition, McGraw –Hill International, Singapore, 2000.
2. J.Senior, "Optical Fiber Communication, Principles and Practice", 3rd Edition, Pearson Publishers, 2010.

REFERENCES:

1. Max Ming-Kang Liu, "Principles and Applications of Optical Communications", 1st Edition, TMH, 2010.
2. S.C.Gupta, "Text book on optical fiber communication and its applications", 2nd Edition, PHI, 2012.

IV B.Tech I Semester

15AEC53 - VLSI DESIGN

L	T	P	C
3	1	0	3

Course Objectives:

1. *To understand VLSI circuit design processes.*
2. *To understand basic circuit concepts and designing Arithmetic Building Blocks.*
3. *To have an overview of Low power VLSI.*

UNIT-I

Introduction: Brief Introduction to IC technology – MOS, PMOS, NMOS, CMOS & Bi-CMOS technologies–Oxidation, Lithography, Diffusion, Ion implantation, Metallization, Encapsulation.

Basic Electrical Properties of MOS and BiCMOS Circuits: Ids–Vds relationships, MOS transistor threshold Voltage, gm, gds, figure of merit ω0; Pass transistor, NMOS Inverter, Various pull ups, CMOS Inverter analysis and design, Bi-CMOS Inverters.

UNIT-II

Basic Circuit Concepts: Sheet Resistance Rs and its concepts to MOS, Area Capacitance calculations, Inverter Delays, Driving large Capacitive Loads, Wiring Capacitances, Fan-in and fan-out.

VLSI Circuit Design Processes: VLSI Design Flow, MOS Layers, Stick Diagrams, Design Rules and Layout, Case study: 2μm CMOS Design rules for wires, Contacts and Transistors Layout Diagrams for NMOS and CMOS Inverters and Gates, Scaling of MOS circuits, Limitations of Scaling.

UNIT-III

Gate level Design: Logic gates and other complex gates, Switch logic, Alternate gate circuits.

Physical Design: Floor-Planning, Placement, routing, Power delay estimation, Clock and Power routing

UNIT-IV

Subsystem Design: Shifters, Adders, ALUs, Multipliers, Parity generators, Comparators, Counters, High Density Memory Elements.

VLSI Design styles: Full-custom, Standard Cells, Gate-arrays, ASIC, FPGAs, CPLDs and Design Approach for Full-custom and Semi-custom devices.

UNIT-V

VLSI Design Tools: The role of design tools in VLSI design process, VLSI design flow using design tools, front-end and back-end tools and their utilization in VLSI design process, study of cadence tools, case study of design of ALU using front-end and back-end tools Layout, Design capture tools, Design Verification Tools.

Course Outcomes: *Students can able to*

a. Design and explain the fabrication of various VLSI circuits.
b. Explain the basic circuit concepts
c. Design various subsystems.
d. Learn about different styles of VLSI design
e. Learn the utilization of design tools for VLSI design process
f. Learn about VLSI design for ASIC's and programmable platforms.

TEXT BOOKS:

1. Kamran Eshraghian, Eshraghian Douglas and A. Pucknell, "Essentials of VLSI circuits and systems", 1st Edition, PHI, 2011.
2. K.Lal Kishore and V.S.V. Prabhakar, "VLSI Design", 1st Edition, IK International Publishing House, 2009.

REFERENCES:

1. Weste and Eshraghian, "Principles of CMOS VLSI Design", 2nd Edition, Pearson Education, 2010.
2. Wayne Wolf, "Modern VLSI Design", 3rd Edition, Pearson Education, 1997.

IV B.Tech I Semester

15AEC54-DIGITAL IMAGE PROCESSING
(CBCC (DEPARTMENTSPECIFIC))

L	T	P	C
3	1	0	3

Course Objectives:

1. To learn the fundamentals of Image Processing.
2. To learn sampling and reconstruction procedures.
3. To learn the various transforms used in image Processing.
4. To study various concepts of image enhancement, reconstruction and image compression.
5. To design image processing systems.

UNIT-1:

DIGITAL IMAGE FUNDAMENTALS: Elements of digital image processing systems, An image model, Basic relationships between pixels and basic transformation, Image acquisition, sampling and quantization, Image file formats Two dimensional convolution, Two dimensional correlation, Two dimensional frequency responses.

Image Transforms: Study analysis with examples of 2D transforms, Transforms: DFT, DCT, Discrete Sine, Walsh, Hadamard, Slant, Haar, KLT, Radon, Hough, and Wavelet

UNIT-2:

IMAGE ENHANCEMENT: Image enhancement through – point processing, Histogram processing, spatial filtering, Enhancement in frequency domain, image smoothing, image sharpening

UNIT-3:

IMAGE RESTORATION: Noise distributions, Degradation model, Unconstrained and constrained restoration, Inverse filtering, minimum mean square error (Wiener) filtering, Constrained least square restoration

UNIT-4:

IMAGE SEGMENTATION AND RECOGNITION: Edge detection, Image segmentation: Region growing, Region splitting and merging, Edge linking, Morphological operations: Dilation, Erosion, Opening, Closing, Image recognition: Patterns and pattern classes, Matching by minimum distance classifier, Statistical classifier, Matching by correlation.

UNIT-5:

IMAGE COMPRESSION: Need for image compression, Image coding, Huffman coding, Run length encoding, Arithmetic encoding, Vector Quantization, Block truncation coding, Transform coding: DCT, Wavelet, Image compression standards

Course Outcomes: *After completion of the course, the student can able to*

a. *Develops ability to identify, formulate &solve problems involving images.*
b. *Develops ability to design &conduct experiments, analyze &interpret image data.*
c. *To design a software, Component or process as per needs &specifications.*
d. *It will demonstrate the skills to use modern engineering tools, software's &equipment to analyze problems.*
e. *Develop confidence for self-education & ability for life-long learning.*
f. *It will show the ability to participate & try to succeed in competitive Exams.*

TEXT BOOKS:

1. R. C. Gonzalez & R.E. Woods, "Digital Image Processing", 3rd Edition, Addison Wesley/Pearson education, 2010.
2. A. K. Jain, "Fundamentals of Digital Image processing", PHI, 1994.

REFERENCES:

1. Rafael C. Gonzalez, Richard E woods and Steven L. Eddins, "Digital Image processing using MATLAB", 2nd Edition, Tata McGraw Hill, 2010.
2. William K. Pratt, "Digital Image Processing", 3rd Edition, John Wilely, 2004.

IV B.Tech I Semester

15AEC55-DSP PROCESSORS & ARCHITECTURES
(CBCC (DEPARTMENTSPECIFIC))

L	T	P	C
3	1	0	3

Course Objectives:

1. To understand the concept of DSP Architecture & comparison of this with that of microprocessors.
2. To understand addressing modes, instruction sets , pipelining and application programs in TMS320C54XX processor
3. To understand the architectural issues of programmable DSP devices and their relationship to the algorithmic requirements, architectures of commercially popular programmable devices and the use of such devices for software development and system design
4. To highlight the suitability of programmable DSP devices for various application areas and motivate to design systems around these devices.

UNIT-I

Introduction to Digital Signal Processing: Introduction, a Digital signal-processing system, the sampling process, Discrete time sequences. Discrete Fourier Transform (DFT) and Fast Fourier Transform (FFT), linear time-invariant systems, Digital filters, Decimation and interpolation, Analysis and Design tool for DSP Systems MATLAB, DSP using MATLAB.

Computational Accuracy in DSP Implementations: Number formats for signals and coefficients in DSP systems, Dynamic Range and Precision, Sources of error in DSP implementations, A/D Conversion errors, DSP Computational errors, D/A Conversion Errors, Compensating filter.

UNIT-II

Architectures for Programmable DSP Devices: Basic Architectural features, DSP Computational Building Blocks, Bus Architecture and Memory, Data Addressing Capabilities, Address Generation Unit, Programmability and Program Execution, Speed Issues, Features for External interfacing.

Execution Control and Pipelining: Hardware looping, Interrupts, Stacks, Relative Branch support, Pipelining and Performance, Pipeline Depth, Interlocking, Branching effects, Interrupt effects, Pipeline Programming models.

UNIT-III

Programmable Digital Signal Processors : Commercial Digital signal-processing Devices, Data Addressing modes of TMS320C54XX DSPs, Data Addressing modes of TMS320C54XX Processors, Memory space of TMS320C54XX Processors, Program Control, TMS320C54XX instructions and Programming, On- Chip Peripherals, Interrupts of TMS320C54XX processors, Pipeline Operation of TMS320C54XX Processors.

UNIT-IV

Implementations of Basic DSP Algorithms : The Q-notation, FIR Filters, IIR Filters, Interpolation Filters, Decimation Filters, PID Controller, Adaptive Filters, 2-D Signal Processing.

Implementation of FFT Algorithms : An FFT Algorithm for DFT Computation, A Butterfly Computation, Overflow and scaling, Bit-Reversed index generation, An 8-Point FFT implementation on the TMS320C54XX, Computation of the signal spectrum.

UNIT-V

Interfacing Memory And I/O Peripherals to Programmable DSP Devices: Memory space organization, External bus interfacing signals, Memory interface, Parallel I/O interface, Programmed I/O, Interrupts and I/O, Direct memory access (DMA). A Multichannel buffered serial port (McBSP), McBSP Programming, a CODEC interface circuit, CODEC programming, A CODEC-DSP interface example.

Course Outcomes: After completion of the course, the student can able to

a. To become familiar with fundamentals of DSP Processors & architectures.
b. To gain in knowledge about the different types of processors and their operation.
c. Will demonstrate the ability to design a system component or process as per needs & specifications.
d. Will demonstrate the ability to identify, formulate & solve engineering problems.

TEXT BOOKS:

1. Avtar Singh and S. Srinivasan, "Digital Signal Processing Implementation", 1st Edition, Cengage Learning, 2004.
2. Lapsley et al. S. Chand & Co, "DSP Processor Fundamentals, Architectures & Features", 2000.

REFERENCES:

1. B. Venkata Ramani and M. Bhaskar, "Digital Signal Processors, Architecture, Programming and Applications", TMH, 2004.
2. Jonatham Stein, "Digital Signal Processing: A Computer Science Perspective", John Wiley, 2000.

IV B.Tech I Semester

15AEC56-CYBER SECURITY
(CBCC (DEPARTMENTSPECIFIC))

L	T	P	C
3	1	0	3

Course Objectives:

1. To study essential concepts for cyber security , cyber security applications, cyber crimes, unauthorized crimes and hacking
2. To gain an understanding of terms commonly used in Cyber Security such as "vulnerability"
3. To study various network defence tools like firewalls and Network address translation, Packet filters etc.
4. To study prohibited action on cyber policies, evaluation of crime scene, evidence collection, cyber security law and policies.
5. To understand the cyber crime investigation.

UNIT-1: Systems Vulnerability Scanning

Overview of vulnerability scanning, Open Port/Service Identification, Banner/Version Check, Traffic Probe, Vulnerability Probe, Vulnerability Examples, OpenVAS, Metasploit. Networks Vulnerability Scanning - Netcat, Socat, understanding Port and Services tools - Datapipe, Fpipe, WinRelay, Network Reconnaissance – Nmap, THC-Amap and System tools. Network Sniffers and Injection tools – Tcpdump and Windump, Wireshark, Ettercap, Hping Kismet

UNIT-2: Network Defense tools

Firewalls and Packet Filters: Firewall Basics, Packet Filter Vs Firewall, How a Firewall Protects a Network, Packet Characteristic to Filter, Stateless VsStateful Firewalls, Network Address Translation (NAT) and Port Forwarding, the basic of Virtual Private Networks, Linux Firewall, Windows Firewall, Snort: Introduction Detection System

UNIT-3: Web Application Tools

Scanning for web vulnerabilities tools: Nikto, W3af, HTTP utilities - Curl, OpenSSL and Stunnel, Application Inspection tools – Zed Attack Proxy, Sqlmap. DVWA, Webgoat, Password Cracking and Brute-Force Tools – John the Ripper, L0htcrack, Pwdump, HTC-Hydra

UNIT-4: Introduction to Cyber Crime and law

Cyber Crimes, Types of Cybercrime, Hacking, Attack vectors, Cyberspace and Criminal Behavior, Clarification of Terms, Traditional Problems Associated with Computer Crime, Introduction to Incident Response, Digital Forensics, Computer Language, Network Language, Realms of the Cyber world, A Brief History of the Internet, Recognizing and Defining Computer Crime, Contemporary Crimes, Computers as Targets, Contaminants and Destruction of Data, Indian IT ACT 2000.

UNIT-5: Introduction to Cyber Crime Investigation

Firewalls and Packet Filters, password Cracking, Keyloggers and Spyware, Virus and Warms, Trojan and backdoors, Steganography, DOS and DDOS attack, SQL injection, Buffer Overflow, Attack on wireless Networks

Course Outcomes: After completion of the course, the student can able to

a. Possess a fundamental knowledge of Cyber security.

b. Understand what vulnerability is and how to address most common vulnerabilities.

c. Understand basic technical controls in use today, such as firewalls and Intrusion Detection systems.

d. Understand cyber policies, Evaluation of Crime scene, evidence collection, Cyber security law and policies and cyber crime investigation.

Text Books:

1. Anti-Hacker Tool Kit (Indian Edition) by Mike Shema, Publication McGraw Hill.
2. Cyber Security Understanding Cyber Crimes, Computer Forensics and Legal Perspectives by Nina Godbole and SunitBelpure, Publication Wiley

Reference Books:

1. James Graham, Ryan Olson, "Cyber Security Essentials," 1st Edition, Auerbach Publications, 2010.
2. Anthony Reyes, Richard Brittson, Keving O'Shea, James Steele, "Cyber Crime Investigations: Bridging the Gaps between Security Professional, Law Enforcement, and Prosecutors," 1st Edition, Syngress Publishing, 2007.

IV B.Tech I Semester

15AEC57-BIO-MEDICAL INSTRUMENTATION
(CBCC (DEPARTMENT SPECIFIC))

L	T	P	C
3	1	0	3

Course Objectives:

1. To understand the functioning of Human Cell and its electrical characteristics.
2. To get Sufficient knowledge about Cardiovascular measurement and circulatory System of heart.
3. To get familiarize with pace makers and Defibrillators.
4. To understand about the electrical hazards that may occur during the usage of medical instruments.

UNIT-I

Human cell and its Electrical characteristics neuron and impulses, Recording Electrodes – Electrode-Electrolyte interface, polarizable – Non-polarizable Electrodes, body surface recording Electrodes, internal Electrodes, Micro Electrodes, Electrode array & Practical hints in using Electrodes.

UNIT-II

Bioelectric potential and cardiovascular measurement circulatory system of heart – ECG Anatomy & Function of heart abnormal cardiac Rhythms – Arrhythmias – Einthoven triangle. EEG recording system (10-20 electrode System) Biorhythms – Sleep pattern

UNIT-III

Therapeutic and prosthetic devices, Cardiac pace maker, Types – Asynchronous and Synchronous modes of operation (Demand). Asynchronous pace maker – Working principle and Function demand PM – Working principle – QRS triggered and atrioventricular Synchronized PM lead wires and Electrodes, Cardioverter.

Defibrillator : Working principle of DC Defibrillation Electrodes used. Infant incubator and Lithotripry.

UNIT-IV

Electrical Hazards in medical instruments macro and micro shock – devices to protect against electrical hazards – Ground fault interrupter, isolation transformer, line isolation monitor, receptacle tester, electrical safety analyzer equipment, preventive maintenance.

UNIT-V

Image Systems: Introduction, Basic principle and block diagram of x-ray machine, x-ray computed topography (C.T. Scanner) and Nuclear Magnetic resonance (NMR) Short-wave Diathermy, Microwave Diathermy, Ultrasound Therapy unit.

Recent trends: Ultrasonography -Introduction, medical ultrasound, block diagram of pulse echo-system, A-Scan, M-mode, B-scanner and real time ultrasound imaging systems – lasers principle and operation of laser types of lasers – Pulsed Ruby laser – ND-YAG laser – Helium –Neon laser-Argon laser-C02 laser exciner laser, Semiconductor lasers – Laser safety.

Course Outcomes: After completion of this course the student will be able to

a. Explain the functioning of Human Cell and its electrical characteristics
b. Acquire knowledge about Cardiovascular measurement and circulatory System of heart
c. Familiarize with pace makers and Defibrillators
d. Know about the electrical hazards that may occur during the usage of medical instruments

Text Books:

1. John G.Webser, "Medical Instrumentation Applications and Design," 3rd Edition, John Wiley & Sons, 1998.
2. Seslie Cromwell, Fred J.Weibell, EsichA.Plefittes, "Bio-Medical Instrumentation & measurements", 9th Edition, Pearson Education, 2007.

References:

1. RS Khandpur, "Handbook of BioMedical Instrumentation", 2nd Edition, Tata McGraw Hill, 1992.
2. Walter Welko- Witiz and Sid Doutsch, "Biomedical Instruments: Theory and Design," 2nd Edition, PHI, 1992.

IV B.Tech I Semester

15AEC58-SATELLITE COMMUNICATIONS
(CBCC (DEPARTMENT SPECIFIC))

L	T	P	C
3	1	0	3

Course Objectives:

1. *To introduce the basic principles of Satellite Communication systems, orbital mechanics, launchers.*
2. *To introduce the basic concepts and designing of Satellite links.*
3. *To introduce the basic concepts of earth station transceiver.*
4. *To know the basic concepts of various multiple access techniques and GPS systems.*

UNIT-I

INTRODUCTION TO SATELLITE COMMUNICATIONS:

Origin of satellite communications, basic concepts of satellite communications, frequency allocations for satellite services, applications, future trends of satellite communications.

Orbital Mechanics look angle determination, orbital perturbations, orbit determination, launches and launch vehicles, orbital effects in communication systems performance.

UNIT-II

SATELLITE SUBSYSTEMS AND LINK DESIGN:

Attitude and orbital control system, Telemetry, Tracking, command and monitoring, power systems, communication subsystems, satellite antenna equipment reliability and space qualification.

Basic transmission theory, system noise temperature and G/T ratio, design of down links, uplink design, design of satellite links for specified C/N, system design example.

UNIT-III

EARTH STATION TECHNOLOGY:

Introduction, transmitters, receivers, Antennas, tracking systems, terrestrial interface, primary power test methods, comparison of LEO and GEO satellite systems in real world.

UNIT-IV

MULTIPLE ACCESS:

Frequency division multiple access (FDMA), Intermodulation, calculation of C/N, Time Division multiple access (TDMA) frame structure, examples. Satellite switched TDMA onboard processing, DAMA, code division multiple access (CDMA), spread spectrum transmission and reception.

UNIT-V

SATELLITE NAVIGATION & THE GLOBAL POSITIONING SYSTEM:

Radio and satellite navigation, GPS position location principles, GPS receivers and codes, satellite signal acquisition, GPS navigation message, GPS signal levels, GPS receiver operation, GPS C/A code accuracy, differential GPS.

Course Outcomes:

a. *Students can determine the location of Satellite.*
b. *Students can design satellite uplink and downlink.*
c. *Students can design earth station transmitter, receiver and antenna systems.*

TEXT BOOKS:

1. Timothi Pratt, Charles Bostian and Jeremy Allnutt, "Satellite communications", 2nd Edition, WSE, Wiley publications, 2003.
2. Wilbur L.Prichard, Robert A. Nelson & Henry G.Suyderhoud, "Satellite communications Engineering", 2nd Edition, Pearson Publications, 2003.

REFERENCES:

1. Dennis Roddy, "Satellite communications", 2nd Edition, McGraw Hill, 1996.
2. K.N.RajaRao, "Fundamentals of Satellite communications", PHI, 2004.

IV B.Tech I Semester

15AEC59-ADVANCED DSP
(CBCC (DEPARTMENT SPECIFIC))

L	T	P	C
3	1	0	3

***Course Objectives*:**

a. To Understand the techniques of modern signal processing that are fundamental to a wide variety of application areas.
b. To know the mathematical basis of discrete time signal analysis, discuss the theory and implementation of FFT algorithms, digital filters.
c. To Understand the discrete Fourier transform (DFT), its applications and its implementation by FFT techniques. Gain some knowledge of the 2-D FFT and its application to image processing and compression.

UNITI

LTI DISCRETE-TIME SYSTEMS IN THE TRANSFORM DOMAIN: Types of Linear-Phase transfer functions, Simple Digital Filters, Complementary Transfer Function, Inverse Systems, System Identification, Digital Two-Pairs, Algebraic Stability Test.

UNITII

DIGITAL FILTER SRTUCTURE AND DESIGN: All Pass Filters, Tunable IIR Digital Filter, IIR Tapped Cascade Lattice Structures, FIR Cascaded Lattice Structures, Parallel All Pass Realization of IIR Transfer Functions, State Space Structures, Polyphase Structures, Digital Sine-Cosine Generator, Computational Complexity of Digital Filter Structures, Design of IIR Filter using pade' approximation, Least Square Design Methods, Design of Computationally Efficient FIR Filters.

UNITIII

DSP ALGORITHEMS: Fast DFT algorithms based on Index mapping, Sliding Discrete Fourier Transform, DFT Computation Over a narrow Frequency Band, Split Radix FFT, Linear filtering approach to Computation of DFT using Chirp Z-Transform.

UNIT IV

POWERSPECTRALESTIMATION: Estimationofspectrafromfinitedurationobservationofsignals, Non-parametric methods: Bartlett, Welch & Blackmann & Tukey methods.

PARAMETRICMETHODSFORPOWERSPECTRUMESTIMATION: Relationbetweenauto correlation &modelparameters,Yule-Waker&BurgMethods,MA&ARMAmodelsforpowerspectrumestimation.

UNITV

ANALYSIS OF FINITE WORD LENGTH EFFECTS INFIXED-POINT DSP SYSTEMS: Fixed, Floating Point Arithmetic–ADC quantizationnoise&signalquality-FinitewordlengtheffectinIIRdigitalFilters–Finiteword-length effects in FFT algorithms.

APPLICATIONS OF DIGITAL SIGNAL PROCESSING: Dual Tone Multi-frequency Signal Detection, Spectral Analysis of Sinusoidal Signals, Spectral Analysis of Non stationary Signals, Musial Sound Processing.

Course Outcomes: After completion of the course, the student can able to

a. Comprehend the concepts of Linear Time Invariant system.
b. Design and analyze the digital filters .
c. Understand the concepts of power spectral and estimation.
d. Understand the basics of multi rate digital signal processing.

TEXTBOOKS:

1. Sanjit K Mitra, "DigitalSignalProcessing: A Computer Based Approach," 4th Edition, McGraw Hill International, 2011.
2. J G Proakis, D G Manolokis, "DigitalSignalProcessing Principles, Algorithms, Applications," 4th Edition, PHI, 2006.

REFERENCES:

1. A V Oppenhiem, R W Schafer, "Discrete-Time Signal Processing," 3rd Edition, Pearson Education, 2010.
2. Emmanuel C Ifeacher Barrie. W. Jervis, "DSP- A Practical Approach," PHI, 2002.

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IV B.Tech I Semester

15AEC60 - DSP & VLSI LABORATORY

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Note: **The students are required to perform any Six Experiments from each Part of the following.**

Part-A: DSP Lab

Course Objectives:

1. *To design real time DSP systems and real world applications.*
2. *To Implement DSP Algorithms using both fixed and floating point processors*
3. *To generate the basic functions of different transforms*
4.

List of Experiments:

1. Generating, plotting and finding the power and energy a given signal.
2. Convolution and correlation (auto and cross) of discrete sequences without using built in functions.
3. DTFT of a given signal
4. N-Point FFT algorithm
5. Design of FIR filter using window technique and verifying the frequency response of the filter
6. Design of IIR filter using any of the available methods and verifying the frequency response of the filter

Course Outcomes: *After completion of the course, the student is able to*

a. *Design real time DSP Systems for real world applications.*
b. *Implement DSP Algorithms using both fixed and floating point processors*

Part-B: VLSI Lab

Course Objectives: *Student will be able to*

1. *Understand the layout design rules.*
2. *Learn implementation of Layout, Physical Verification and place & route for complex designs.*
3. *Learn the layout of any combinational circuit.*
4. *Verify the Layouts of DRC and LVS.*

List of Experiments:

Note: Any 4 of the above experiments are to be conducted. Exp.1 & 2 is mandatory.

1. Introduction to layout design rules
2. Layout, physical verification, placement & route for complex design, static timing analysis, IR drop analysis and crosstalk analysis of the following:
   - Basic logic gates
   - CMOS inverter
   - CMOS NOR/NAND gates
   - CMOR XOR MUX gates
   - CMOS 1-bit full adder

- ➢ Static/Dynamic logic circuit(register cell)
- ➢ Latch
- ➢ Pass transistor

3. Layout of any combinational circuit (complex CMOS logic gate) – learning about data paths
4. Introduction of Simulation and coding of NMOS/CMOS circuit
5. Simulation of basic analog circuits: Inverter/Differential amplifier
6. Analog Circuit simulation (AC analysis) – CS & CD amplifier

Course Outcomes: *Upon completion of the course, students will be able to:*

a. *Gain knowledge in Design of logic designs*
b. *Know to write HDL codes for all digital designs and implement using simulation tools.*
c. *Know obtaining static timing analysis, IR drop analysis and crosstalk analysis of combinational and sequential circuits.*
d. *Know the simulation of basic analog circuits.*

IV B.Tech I Semester

15AEC61 - MICROWAVE & OPTICAL COMMUNICATIONS LAB

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Course Objectives:

1. *To verify the characteristics of various microwave components using microwave test bench.*
2. *Initiate an expose the newcomers to exciting area of optical communication*

PART-A: Microwave Lab - Any Seven (7) Experiments

1. Reflex Klystron Characteristics.
2. Gunn Diode Characteristics.
3. Attenuation Measurement.
4. Directional Coupler Characteristics.
5. VSWR Measurement.
6. Impedance Measurement.
7. Frequency and Wavelength measurements using slotted section.
8. Scattering parameters of Directional Coupler.
9. Scattering parameters of Magic Tee.
10. Radiation Pattern Measurement of horn Antennas (at least two antennas).

PART-B: Optical Fiber Lab - Any five (5) Experiments

1. Characterization of LED.
2. Characterization of Laser Diode.
3. Intensity modulation of Laser output through an optical fiber.
4. Measurement of Data rate for Digital Optical link.
5. Measurement of Numerical Aperture of the given fiber.
6. Measurement of losses for Analog Optical link.

Equipment required for Laboratories:

1.	Regulated Klystron Power Supply	6 nos.
2.	VSWR Meter	6 nos.
3.	Milli/Micro Ammetersn	10 nos.
4.	Multi meters	10 nos.
5.	CROs	8 nos.
6.	GUNN Power Supply, Pin Moderator	4 nos.
7.	Reflex Klystron with mount	10 nos.
8.	Crystal Diodes	50 nos.
9.	Micro wave components (Attenuation)	10 nos.
10.	Frequency Meter (Direct frequency)	10 nos.

11. Slotted line with carriage 10 nos.
12. Probe detector 10 nos.
13. Wave guide shorts 6 nos.
14. Pyramidal/conical Horn Antennas 4 nos.
15. Rectangular to circular transition2 nos.
16. Directional Couplers with different (coupling factors) 5 nos.
17. E, H, Magic Tees 2 nos. each.
18. Circulators, Isolator 10 nos.
19. Matched Loads 30 nos.
20. Antenna Training System with Tripod and Accessories 1no.
21. Fiber Optic Analog Trainer based LED 3 nos.
22. Fiber Optic Analog Trainer based laser 2nos.
23. Fiber Optic Digital Trainer 1 no.
24. Fiber cables - (Plastic, Glass)

Course Outcomes:

a. Students acquire applications and testing of microwave components.

b. Students acquire knowledge on the various applications of optical fiber communications

c. Students develop confidence for self-education and ability for life -long learning.

IV B.Tech II Semester

15AEC81 - EMBEDDED SYSTEMS & INTERNET OF THINGS

L	T	P	C
3	1	0	3

Course Objectives:

1. *Understand the basics of Embedded System, IoT and the development model*
2. *Understand the architecture, Instruction set and work on ARM microcontroller using practical hands-on.*
3. *Ability to select appropriate hardware and microcontrollers based on need of application*
4. *Understand the Internet of Things Standards, Frameworks and Techniques*
5. *Apply the tools, techniques and skills acquired towards development of Projects.*

UNIT I: Introduction to Embedded Systems and Internet of Things (IoT)

Architecture of Embedded Systems, Embedded Systems Development process, Architecture of Internet of Things, Applications of Embedded Systems and IoT, Design Methodology for IOT Products.

UNIT II – ARM Microcontrollers Architecture and Programming

Architecture, Instruction set, Programming ports, Timer/Counter, Serial communication, interrupts in C, Introduction ARM mBed platform.

UNIT III – Fundamentals of Python Programming & Raspberry Pi

Introduction to python programming, Working with functions, classes, RESTfull Web Services, Client Libraries, Introduction & programming Raspberry Pi3, Integrating Input Output devices with Raspberry Pi3

UNIT IV - IoT: Technologies, Standards And Tools

Fundamental characteristics and high level requirements of IoT, IoT Reference models; Introduction to Communication Technologies & Protocols of IoT: BLE, Wi-Fi, LoRA, 3G/4G Technologies and HTTP, MQTT, CoAP protocols; Relevant Practicals on above technologies

UNIT V – IoT Platform: Cloud Computing Platforms for IoT Development (IBM Cloud)

IOT Platform Architecture (IBM Internet of Things & Watson Platforms); API Endpoints for Platform Services; Devices Creation and Data Transmission; Introduction to NODE-RED and Application deployment

Course Outcomes: *After completion of the course, the student is able to*

a. *Understand the vision of IoT from a global context.*
b. *Provide in-depth knowledge about ARM Architecture and its instruction set.*
c. *Able to realize the revolution of Internet in Mobile Devices, Cloud & Sensor Networks*
d. *Implement state of the art architecture in IoT.*
e. *Illustrate the application of IoT in Industrial Automation and identify Real World Design Constraints.*

TEXT BOOKS

1. ArsheepBahga, Vijay Madisetti, "Internet of Things: A Hands-On Approach," 1st Edition, VPT, 2014.
2. K.V.K.K.Prasad, "Embedded Real Time Systems: Concepts, Design and Programming," 1st Edition, Dreamtech Publication, 2014.
3. Adrian McEwen, Hakim Cassimally, "Designing the Internet of Thingsl," Wiley Publications, 2013

REFERENCES

1. Jonathan W Valvano, "Embedded Microcomputer Systems: Real-Time Interfacing," 3rd Edition, Thomson Engineering, 2012.
2. Olivier Hersent, David Boswarthick, Omar Elloumi, "The Internet of Things: Key applications and Protocolsl," 2nd Edition, Wiley Publications, 2012.

IV B.Tech II Semester

15AEC82 - RADAR AND NAVIGATIONAL AIDS

L	T	P	C
3	1	0	3

Course Objectives:

1. *The students to be able to understand, analyze, and design fundamental Basic radar systems.*
2. *To know various Radar systems such as pulse radar, CW radar etc.*
3. *To understand various Radar systems techniques and their applications.*
4. *Understanding of Radar systems by using a series of specific examples and problems*

UNIT I

BASICS OF RADAR: Introduction, Maximum Unambiguous Range, Simple form of Radar Equation, Radar Block Diagram and Operation, Radar Frequencies and Applications, Prediction of Range Performance, Minimum Detectable Signal, Receiver Noise, Modified Radar Range Equation, Illustrative Problems. Radar Equation: SNR, Envelope Detector, False Alarm Time and Probability, Integration of Radar Pulses, Radar Cross Section of Targets (simple targets - sphere, cone-sphere), Transmitter Power, PRF and Range Ambiguities, System Losses (qualitative treatment), Illustrative Problems.

UNIT II

CW AND FREQUENCY MODULATED RADAR: Doppler Effect, CW Radar – Block Diagram, Isolation between Transmitter and Receiver, Non-zero IF Receiver, Receiver Bandwidth Requirements, Applications of CW radar, Illustrative Problems.FM-CW Radar, Range and Doppler Measurement, Block Diagram and Characteristics (Approaching/ Receding Targets), FM-CW altimeter, Multiple Frequency CW Radar.

UNIT III

MTI AND PULSE DOPPLER RADAR: Introduction, Principle, MTI Radar with - Power Amplifier Transmitter and Power Oscillator Transmitter, Delay Line Cancellers – Filter Characteristics, Blind Speeds, Double Cancellation, And Staggered PRFs. Range Gated Doppler Filters, MTI Radar Parameters, Limitations to MTI Performance,MTI versus Pulse Doppler radar.

TRACKING RADAR: Tracking with Radar, Sequential Lobing, Conical Scan, Monopulse Tracking Radar – Amplitude Comparison Monopulse (one- and two-coordinates), Phase Comparison Monopulse, Tracking in Range, Acquisition and Scanning Patterns, Comparison of Trackers.

UNIT IV

DETECTION OF RADAR SIGNALS IN NOISE: Introduction, Matched Filter Receiver – Response Characteristics and Derivation, Correlation Function and Cross-correlation Receiver, Efficiency of Non-matched Filters, Matched Filter with Non-white Noise.

RADAR RECEIVERS: Noise Figure and Noise Temperature, Displays – types. Duplexers – Branch type and Balanced type, Circulators as Duplexers. Introduction to Phased Array Antennas – Basic Concepts, Radiation Pattern, Beam Steering and Beam Width changes, Series versus Parallel Feeds, Applications, Advantages and Limitations.

UNIT V

NAVIGATIONAL AIDS: Introduction, Four Methods of Navigation ,Radio Direction Findings, Radio Ranges, Hyperbolic Systems of Navigation, Aids to approach and Landing

MODERN NAVIGATION: Doppler navigation-Doppler Effect, New configuration, Doppler frequency equations, Track stabilization, Doppler navigation system , GPS principle of operation, Position location determination, principle of GPS receiver

Course Outcomes: *At the end of the course, the students should be able to:*

a. *Able to understand The Radar Operation and targets of the system*
b. *Know the difference between MTI radar, monopulse radar, and apply their concepts in the analysis and design of Tracking systems.*
c. *Understand the basic principles of Radar receiver and their schemes.*
d. *Analyze noise in the case of detection of Radar receiver in radar systems.*
e. *Able to know the methods of navigation, approaches and landing.*
f. *Able to understand the Modern navigational approaches.*

TEXT BOOKS:

1. Merrill I. Skolnik, "Introduction to Radar Systems," 2nd Edition, TMH Special Indian Edition, 2007.
2. Byron Edde, "Radar Principals, Technology, Applications," Pearson Education, 1992.

REFERENCES:

1. Introduction to Radar Systems – Merrill I. Skolnik, 3rd Edition, Tata McGraw-Hill, 2001.
2. Peebles, "Radar Principles," Wiley, New York, 1998.

IV B.Tech II Semester

15AEC83 - WIRELESS COMMUNICATIONS

L	T	P	C
3	1	0	3

Course Objectives:

1. To understand basics of Wireless Communications and its evolution process.
2. To learn about the mechanism of radio mobile propagation and its effects.
3. To understand various types of diversity and equalization techniques to counter balance the effects of Wireless Channel.
4. To Study about importance of Wireless Networking and multiple access techniques in the present day mobile communications
5. To design and analyze mobile systems using OFDM technology for mitigating the ISI effects at higher data rates.

UNIT – 1

Introduction to Wireless Communication Systems & Cellular Concept:

Evolution of Mobile Radio Communication Systems, Examples of Wireless Communication Systems, 1G, 2G, 2.5G, and 3G Wireless Cellular Networks and Standards, Frequency Reuse Concept, Channel Assignment Strategies, Interference and System Capacity, Trunking and Grade of Service, Improving Coverage and Capacity in Cellular Systems, Problem Solving.

UNIT - 2

Mobile Radio Propagation:

Large Scale Path Loss: Introduction, Free Space Propagation Model, *Propagation Mechanisms* – Reflection, Diffraction, and Scattering, Practical Budget Design using Path Loss Models, Outdoor Propagation Models, Indoor Propagation Models.

Small Scale Fading and Multipath: Small Scale Multipath Propagation, Impulse Response Model of a Multipath Channel, Small Scale Multipath Measurements, Parameters of Mobile Channels, Types of Small Scale Fading (all variations*), Statistical Models* – Clarke's Model for Flat Fading, Jake's Model, Level Crossing Rate, Simulation of Clarke's/Jake's Model, Two Ray Rayleigh Fading Model, Problem Solving.

UNIT -3

Equalization & Diversity Techniques:

Equalization: Survey of Equalization Techniques, Linear and Non-linear Equalizers – Linear Transversal Equalizer, Decision Feedback Equalizer (DFE), Algorithms for Adaptive Equalization – Zero Forcing, LMS, RLS, Fractionally Spaced Equalizers.

Diversity Techniques: Realization of Independent Fading Paths, *Receiver Diversity* – System Model, Selection Combining, Threshold Combining, Maximal Ratio Combining, Rake receiver, Equal Gain Combining, *Transmit Diversity*–Channel known at Transmitter, Channel unknown at Transmitter – the Alamouti Scheme, analysis.

UNIT - 4

Multiple Access Techniques & Networking:

Introduction to Multiple Access: FDMA, TDMA, CDMA, SDMA, Packet Radio, Capacity of Cellular Systems, Problem Solving.

Introduction to Wireless Networking: Introduction to Wireless Networks, Differences between Wireless and Fixed Telephone Networks, Development of Wireless Networks, Traffic Routing in Wireless Networks, Wireless Data Services, Common Channel Signaling.

UNIT - 5

Multicarrier Modulation:

Data Transmission using Multiple Carriers, Multicarrier Modulation with Overlapping Subchannels, Discrete Implementation of Multicarrier Modulation, The Cyclic Prefix, Orthogonal Frequency Division Multiplexing (OFDM), Matrix Representation of OFDM, Vector Coding, Challenges in Multicarrier Systems, Problem Solving.

Course Outcomes: After completion of this course the students will be able to

a. Understand basics of Wireless Communications and its evolution process.
b. Know about the mechanism of radio mobile propagation and its effects.
c. Apply various types of diversity and equalization techniques to counter balance the effects of Wireless Channel.
d. Recognize the importance of Wireless Networking and multiple access techniques in the present day mobile communications
e. Analyze and design mobile systems using OFDM technology for mitigating the ISI effects at higher data rates.

TEXT BOOKS:

1. Aditya K Jagannatham, "Principles of Modern Wireless Communications Systems," 1st Edition, McGraw Hill, 2015.
2. T. S. Rappaport, "Wireless Communications, Principles and Practice," 2nd Edition, Prentice Hall, 2002.

REFERENCES:

1. Andrea Goldsmith, "Wireless Communications," Cambridge University Press, 2005.
2. David Tse, PramodViswanath, "Fundamentals of Wireless Communications," Cambridge University Press, 2006.

B.TECH - R15 REGULATIONS

CHOICE BASED CREDIT COURSES (INTER DEPARTMENT)

OFFERED

IN

II YEAR I SEMESTER

w.e.f.

2015 ADMITTED BATCH

DEPARTMENT OF ELECTRICAL & ELECTRONICS ENGINEERING

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

COLLEGE OF ENGINEERING (AUTONOMOUS) :: PULIVENDULA

PULIVENDULA – 516390, Y.S.R. (DIST), ANDHRA PRADESH, INDIA

ANNEXURE-I

Choice Based Credit Course of Inter Department
offered in

B.TECH II YEAR I SEMESTER

BRANCH	SUBJECT CODE	SUBJECT NAME
PHYSICS	15ABS12	Basics of Nano Science and Nano Technology
MATHEMATICS	15ABS14	Set Theory and Mathematical Logic
	15ABS23	Mathematical Modeling
CHEMISTRY	15ABS15	Green Chemistry and Catalysis for Sustainable Environment
	15ABS16	Instrumental Methods of Chemical Analysis
	15ABS17	Chemistry of Nano Material and Application
ENGLISH	15AHS08	Campus Recruitment Training & Soft Skills
	15AHS09	Competitive & Spoken English
CE	15ACE09	Green Buildings
	15ACE10	Disaster Management and Mitigation
	15ACE11	Water Harvesting and Conservation
ECE	15AEC08	Basic Electronics
	15AEC09	Fundamentals of Digital Electronics
	15AEC10	Electronic Measurements & Instrumentation
ME	15AME11	Robotics
	15AME12	Mechanical Manufacturing Process
	15AME13	Non-Conventional Sources of Energy
EEE	15AEE08	Principles of electrical engineering
	15AEE01	Electrical engineering materials
	15AEE09	Electrical measuring instruments
CSE	15ACS04	Data Structures
	15ACS11	Object oriented Programming
	15ACS08	Operating Systems

II B.Tech – I Sem

15ABS12-Basics of Nano science and Nanotechnology
(Choice Based Credit Courses (Inter-department))

L	T	P	C
3	1	0	3

OBJECTIVES:

1. To understand the fundamentals of nanoscience and nanotechnology
2. To give a general introduction to different classes of nanomaterials
3. To impart basic knowledge on various synthesis and characterization techniques involved in Nanotechnology
4. To make the learner familiarize with nanotechnology potentialities.

Unit-I Basics of Nanoscience:
Introductory quantum mechanics for nano science- Historical back ground of nanoscience - Density of states for zero, one, two and three dimensional materials, Quantum confinement, Quantum wells, wires, dots, Factors affecting to particle size, Metal semiconductor (MS) and metal insulator (MI).

Unit-II Properties of Nanomaterials:
Mechanical, Thermal, Electrical, Optical, Magnetic and Structural properties, Carbon based materials- Fabrication, structure, electrical properties and mechanical properties.

Unit-III Synthesis of Nanomaterials:
Physical methods: Bottom up-Ball Milling, Physical vapour deposition, Laser pyrolysis, Sputter deposition.
Chemical methods: Hydrothermal, Sol-gel method, solution combustion method, Co-precipitation method.

Unit-IV Characterization:
Spectroscopic techniques: UV- Visible Spectroscopy, Fourier Transform infrared (FTIR) spectroscopy, Principles and analysis of X-ray diffraction (XRD); electron diffraction, Scanning Electron Microscope (SEM) – Transmission Electron Microscope (TEM).

Unit –V Applications:
Nano engineered materials – coatings – catalysts - nano scale thin films for water-repellent, antireflective and self cleaning surfaces. Communication systems, solar cells and energy storage applications.

TEXT BOOKS

1. ***A Textbook of Nanoscience and Nanotechnology,*** Pradeep T.,Tata Mc Graw Hill Education Pvt. Ltd., 2012.
2. Introduction to Nano Technology, Charles P. Poole Jr & Frank J. Owens. John Wiley and Sons, 2003.
3. The Chemistry of nanomaterials: Synthesis, Properties and Applications, C.N.R. Rao, A. Muller and A.K. Cheetham, Vol – 1, Wiley Online Library, 2005.
4. The Physics of Micro/Nano- Fabrication, Ivor Brodie & Julius J.Muray, Springer, 1992.

REFERENCES

1. ***Nanoscience: Nanotechnologies and Nanophysics,*** Dupas C., Houdy P., Lahmani M., Springer-Verlag Berlin Heidelberg, 2007.
2. Quantum Physics, A. Ghatak & S. Lokanathan, 5th Edition, Mac Millan India, 2004.
3. Nanophysics and Nanotechnology, Edward L. Wolf, Wiley-VCH, 2006.
4. Elements of X-ray Diffraction, B.D.Cullity, Addision Wesely, 1978.
5. Concise Encyclopedia of Materials Characterization, Robert Cahn, 2nd Edition (Advances in Materials Science and Engineering), Elsevier Publication, 2005.

Outcomes:

- Students will have the exposure to the multidisciplinary area of nanoscience.
- The necessary foundation for advanced materials engineering subject.
- Familiarity about the necessary characterization tools for nanoscale.
- Overview on the importance of nanoscience and nanotechnology through recent applications.

II B.Tech – I Sem

15ABS14- SET THEORY AND MATHEMATICAL LOGIC

(Choice Based Credit Courses (Inter-department))

L	T	P	C
3	1	0	3

Objectives:

- This course aims at providing the student with the concepts of statements, sets relations and Mathematical induction.

UNIT – I

Statement, truth values, negation, conjunction, disjunction, conditional and biconditional, contrapositive statement.

UNIT – II

Set, subset, superset, operations viz. union, intersection, complement etc. of sets; power set, cartesian product.

UNIT – III

Equivalence relations, equivalence classes, partition, fundamental theorem of equivalence relation, partial order relation, Poset, chain, upper & lower bounds in poset, greatest & least elements, maximal & minimal elements, supremum & infimum, Zorn's lemma, introduction to lattice theory. Functions, injection, surjection and bijection; image and pre-image of set under function and inverse mapping, composite mapping.

UNIT – IV

Peano's axioms, principle of mathematical induction, well ordering principle, axiom of choice.

UNIT – V

Finite and infinite sets, countable and uncountable sets, Schroeder Bernstein Theorem, Continuum hypothesis.

TEXT BOOKS:

1. P. R. Halmos, Naive Set Theory Springer, 2009.
2. Bartle, R. G. and Sherbert, D. R. Introduction to Real Analysis, (John Wiley and Sons, Third (Indian) Edition), 2007.

REFERENCES:

1. K. Hrbacek and T. Jech, Introduction to Set Theory , 3rd edition, CRC press, 1999.

Outcomes: The student will be able to analyze the Mathematical logical structures with the concepts of statements, sets, relations and Mathematical Induction.

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II B.Tech – **I Sem**

15ABS23-Mathematical Modeling
(Choice based Credit Course)

L	T	P	C
3	1	0	3

Objectives:

- This course aims at providing the basic knowledge to understand a Mathematical model and formulate a Mathematical model related to a real word problems of engineering, biological science etc.

UNIT – I

Mathematical Modeling: Need, Techniques, Classifications and Simple illustarations,
Mathematical modeling Through Ordinary differential equations of First Order : Mathematical modeling Through differential equations; Linear growth and decay models; Non-Linear Growth and Decay models; Mathematical modeling in dynamics through ordinary differential equations of first order.

UNIT – II

Mathematical modeling Through System of Ordinary differential equations of First Order: Mathematical modeling in population dynamics; Mathematical modeling of Epidemics through system of ordinary differential equations of first order; Compartment models through Systems of ordinary differential equations; Mathematical modeling in dynamics through systems of ordinary differential equations of first order.

UNIT – III

Mathematical modeling Through Ordinary differential equations of Second Order: Mathematical modeling of Planetary motion ; Mathematical modeling of Circular motion and motion of satellites; Mathematical modeling through linear differential equations of second order.

UNIT – IV

Mathematical modeling Through Difference equations : Need for Mathematical modeling Through Difference equations and simple models; Basic theory of Linear difference equations with constant coefficients; Mathematical modeling Through Difference equations in population dynamics and genetics; Mathematical modeling Through Difference equations in Probability theory.

UNIT – V

Mathematical modeling Through Functional, Integral, Delay- Differential and Differential-Difference Equations: Mathematical modeling Through Functional equations;
Mathematical modeling Through Integral equations; Mathematical modeling Through Delay-Differential and Differential-Difference Equations.

TEXT BOOKS:

1. J. N. Kapoor. Mathematical Modeling, NEW AGE INTERNATIONAL PUBLISHERS.

REFERENCES:

1. A. C. Fowler. Mathematical Models in Applied Sciences, Cambridge University Press.

Outcomes: The student will be able to analyze the real word problem through the technique of modeling of that problem to have better insight of the real word problem.

II B.Tech – **I Sem**

15ABS15-GREEN CHEMISTRY AND CATALYSIS FOR SUSTAINABLE ENVIRONMENT

(Choice Based Credit Courses (Inter-department))

L	T	P	C
3	1	0	3

Course Objectives:

- Learn an interdisciplinary approach to the scientific and societal issues arising from industrial chemical production, including the facets of chemistry and environmental health sciences that can be integrated to promote green chemistry and the redesign of chemicals, industrial processes and products.
- Understand the use of alternatives assessments that combine chemical, environmental health, regulatory, and business considerations to develop safer products.

UNIT 1: Principles And Concepts Of Green Chemistry

Introduction, Green chemistry Principles, sustainable development and green chemistry, atom economy, atom economic: Rearrangement and addition reactions and un-economic reactions: Substitution, elimination and Wittig reactions, Reducing Toxicity. Waste - problems and Prevention: Design for degradation, Polymer recycling.

UNIT 2: Catalysis And Green Chemistry

Introduction to catalysis, Heterogeneous catalysts: Basics of Heterogeneous Catalysis, Zeolites and the Bulk Chemical Industry, Heterogeneous Catalysis in the Fine Chemical and Pharmaceutical Industries, Catalytic Converters, Homogeneous catalysis: Transition Metal Catalysts with Phosphine Ligands, Greener Lewis Acids, Asymmetric Catalysis, Heterogenising the Homogenous catalysts, Phase transfer catalysis: Hazard Reduction, C–C Bond Formation, Oxidation Using Hydrogen Peroxide, Bio-catalysis and photo-catalysis with examples.

UNIT 3: Organic Solvents: Environmentally Benign Solutions

Organic solvents and volatile organic compounds, solvent free systems, supercritical fluids: Super critical carbondioxide, super critical water and water as a reaction solvent: water based coatings, Ionic liquids as catalyst and solvent.

UNIT 4: Emerging Greener Technologies And Alternative Energy Sources

Biomass as renewable resource, Energy: Fossil Fuels, Energy from Biomass, Solar Power, Other Forms of Renewable Energy, Fuel Cells, Chemicals from Renewable feedstocks: Chemicals from Renewable Feedstocks: Chemicals from Fatty Acids, Polymers from Renewable Resources, Some Other Chemicals from Natural Resources, Alternative Economies: The Syngas Economy, The Biorefinery, Design for energy efficiency: Photochemical Reactions: Advantages of and Challenges Faced by Photochemical

Processes, Examples of Photochemical Reactions, Chemistry Using Microwaves: Microwave Heating, Microwave-assisted Reactions, Sonochemistry: Sonochemistry and Green Chemistry, Electrochemical Synthesis: Examples of Electrochemical Synthesis. Industrial applications of alternative environmentally benign catalytic systems for carrying out the important reactions such as selective oxidation, reduction and C-C bond formations (specific reactions).

UNIT 5: Green Processes For Green Nanoscience

Introduction and traditional methods in the nanomaterials synthesis, Translating green chemistry principles for practicing Green Nanoscience. Green Synthesis of Nanophase Inorganic Materials and Metal Oxide Nanoparticles: Hydrothermal Synthesis, Reflux Synthesis, Microwave-Assisted Synthesis, Other methods for Green synthesis of metal and metal oxide nanoparticles, Green chemistry applications of Inorganic nanomaterials

Text Books :

1. M. Lancaster, Green Chemistry an introductory text, Royal Society of Chemistry, 2002.
2. Paul T. Anastas and John C. Warner, Green Chemistry Theory and Practice, 4th Edition,

   Oxford University Press, USA

References :

1. Green Chemistry for Environmental Sustainability, First Edition, Sanjay K. Sharma and Ackmez Mudhoo, CRC Press, 2010.
2. Edited by Alvise Perosa and Maurizio Selva , Hand Book of Green chemistry Volume 8:

   Green Nanoscience, wiley-VCH, 2013.

Course Outcomes:

Upon completion of this course the students should recognize and acquire green chemistry concepts and apply these ideas to develop respect for the inter connectedness of our world and an ethic of environmental care and sustainability.

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II B.Tech – I Sem

15ABS16-INSTRUMENTAL METHODS OF CHEMICAL ANALYSIS

(Choice Based Credit Courses (Inter-department))

L	T	P	C
3	1	0	3

Course Objectives:

- To understand the principles of different instruments
- To apply the instruments for analysis of various species in different matrices
- To apply instrumental methods for framing project works

UNIT – I: Molecular Spectrophotometry

Absorption spectra, Lamberts Law, Beer's Law - Combined law equation; Derivations from Beer's Law. Block diagram of a uv- visible spectrophotometer – quantitative analysis ; Direct method for the determination of metal ions; Chromium, Manganese, Iron etc in alloys.

UNIT – II: Infrared Spectroscopy

Interaction of infra-red radiation with molecules, Sources of IR Radiation ; Spectral regions; Block diagram of IR Spectrometer , Function of each component; Sampling Techniques; Application of IR Spectroscopy to functional group analysis (-OH, $-NH_2$, -CHO, -CO-R, -CONH).

UNIT III: Chromatography

Gas Chromatography: Principles of Gas Chromatography, block diagram of gas chromatograph, Function of each component, Detectors (FID, ECD), stationary phase for column, mobile phase, chromatogram, qualitative analysis, quantitative analysis, retention time, retention volume, capacity factor, area., normalization method. Analysis of gaseous and volatile impurities.

HPLC: Principles of high performance liquid chromatography, Block diagram of HPCL, Systems, functions of each component, stationary phases, eluting solvents, pumps, detectors, quantitative applications of HPLC for environmental analysis.

UNIT IV: Atomic Spectrophotometry

Principle of atomization, atomic absorption spectrometer, applications for metal ions, Atomic emission, application and principle of ICP-OES, X-ray fluorescence spectrometry- Applications

UNIT V: Thermal methods of analysis

TGA- Thermo Gavimetry – Principle, instrumentation and applications
DTA- Differential Thermal Analysis- Principle, instrumentation and applications
DSC- Differential Scanning Coulometry- Principle, instrumentation and applications

Text BOOK:

1. Principles of Instrumental Analysis, 6th Edition, Douglas A. Skoog, James Holler. J, Stanley R. Crouch, Cengage Learning, New Delhi, 2014.
2. Instrumentaiotn methods of analysis, Chatwal & Anand, Himalaya Publ;ications, 2003

REFERENCES:

1. Instrumental methods of analysis, Willand merrit and dean, caps publications & Distribution, 1999.
2. Vogels Text book of Quantitative chemical analysis, 6^{th} edition ,Mendham J, Denny R.C,Barnes J.D, Thomas M.J.K, pearson education, 2002.
3. Modern Analytical Chemistry, 1^{st} edition, David Harvey, McGraw-Hill Higher Education, 2010.

Course Outcomes:

Upon successful completion of this course, the students will be able to:

1. Differentiate between classical and instrumental methods of Chemical analysis.
2. Apply different types of Instrumental methods for analysis of various samples in water and other environmental samples

II B.Tech – **I Sem**

15ABS17-CHEMISTRY OF NANO MATERIALS AND APPLICATIONS
(Choice Based Credit Courses (Inter-department))

L	T	P	C
3	1	0	3

Course Objectives:

- To understand synthetic principles of Nanomaterials by various methods
- And also characterisae the synthetic nanomaterials by various instrumental methods
- To enumerate the applications of nanomaterials in engineering

Unit I:

Introduction:Scope of nanoscience and nanotecnology, nanoscience in nature, classification of nanostructured materials, importance of nano materials.

Synthetic Methods: Bottom-Up approach:- Sol-gel synthesis, microemulsions or reverse micelles, co-precipitation method, solvothermal synthesis, hydrothermal synthesis, microwave heating synthesis and sonochemical synthesis.

UNIT-II

Top-Down approach:- Inert gas condensation, arc discharge method, aerosol synthesis, plasma arc technique, ion sputtering, laser ablation, laser pyrolysis, and chemical vapour deposition method, electrodeposition method, high energy ball milling.

UNIT-III

Techniques for characterization: Diffraction technique, spectroscopy techniques, electron microscopy techniques for the characterization of nanomaterilas, BET method for surface area analysis, dynamic light scattering for particle size determination.

UNIT-IV

Studies of Nano-structured Materials: Synthesis, properties and applications of the following nanomaterials, fullerenes, carbon nanotubes, core-shell nanoparticles, nanoshells, self-assembled monolayers, and monolayer protected metal nanoparticles, nanocrystalline materials, magnetic nanoparticles and important properties in relation to nanomagnetic materials, thermoelectric materials, non-linear optical materials, liquid crystals.

UNIT.V

Engineering Applications of Nanomaterials

TEXT BOOKS:

1. NANO: The Essentials : T Pradeep, MaGraw-Hill, 2007.
2. Textbook of Nanoscience and nanotechnology: B S Murty, P Shankar, Baldev Rai, BB Rath and James Murday, Univ. Press, 2012.

REFERENCE BOOKS:

1. Concepts of Nanochemistry; Ludovico Cademrtiri and Geoffrey A. Ozin & Geoffrey A. Ozin, Wiley-VCH, 2011.

2. Nanostructures & Nanomaterials; Synthesis, Properties & Applications: Guozhong Cao, Imperial College Press, 2007.
3. Nanomaterials Chemistry, C. N. R. Rao, Achim Muller, K.Cheetham, Wiley-VCH, 2007.

Course Out Come: At the end of the course, the student will be able to:

- Understand the state of art synthesis of nano materials
- Characterize nano materials using ion beam, scanning probe methodologies, position sensitive atom probe and spectroscopic ellipsometry.
- Analyze nanoscale structure in metals, polymers and ceramics
- Analyze structure-property relationship in coarser scale structures
- Understand structures of carbon nano tubes

II B.Tech – I Sem

15AHS08-CAMPUS RECRUITMENT TRAINING & SOFT SKILLS

(Choice Based Credit Courses (Inter-department))

L	T	P	C
3	1	0	3

Objectives:

1. To develop awareness in students of the relevance and importance of soft skills.
2. To provide students with interactive practice sessions to make them internalize soft skills.
3. To prepare the students for placements.
4. To train students to use language appropriately for interviews, group discussion and public speaking
5. To help the students to understand interpersonal skills.
6. To support them in building interpersonal skills.
7. To better the ability to work with others

Outcome:

After completing this course,

- The students would have Understood of what Soft Skills is,
- Understood the significance of soft skills in the working environment
- Turning out engineering students with a clear concept of soft skills and equipping them with readiness to implement them at work place.

UNIT I: Interview Dynamics-Preparation-Power Selling- Cracking the top Questions-Stress Control.

UNIT II: Intra Personal Skills: Knowing Strengths & Weaknesses – Goal Setting-Quotient Skills- Positive thinking- Problem Solving-analytical Skills.

UNIT III: Intra Personal Skills: Managerial Skills, Group dynamics- Negotiation Skills-Time Management.

UNIT IV: Verbal Skills: Dynamics of listening, Speaking, Reading & Writing skills- Email writing.

UNIT V: Non Verbal Skills: Body Language- Body Posture, Gestures, Eye Contact, Facial Expressions, Appearance, Space Distance /Proxemics , Touch/Haptics,. Para Language-Tone, Pace, Pause, Volume , Quality .

REFERENCE BOOKS:

1. M. Ashraf Rizvi: Effective Technical Communication, Tata McGraw Hill, New Delhi, 2014.
2. Alex.k, soft skills, 3rd ed. S. Chand Publication, New Delhi, 2014.
3. Technical Communication, Principle and Practice, Meenakshi Raman and Sangita Sharma, OUP, 2009.

4. Sherfield, M. Robert at al Cornerstone Developing Soft Skills, 4th ed. Pearson Publication,
New Delhi, 2014.
5. Shalini Varma, Body Language for your success mantra, 4th ed, S. Chand Publication, New Delhi, 2014.

II B.Tech – **I Sem**

15AHS09-COMPETITIVE & SPOKEN ENGLISH.
(Choice Based Credit Courses (Inter-department))

L	T	P	C
3	1	0	3

Objectives:

- To train students to use language effectively in everyday conversations, to participate in group discussions, to help them face interviews, and sharpen public speaking skills
- To help the second language learners to acquire fluency in spoken English and neutralize mother tongue influence.
- To enable them to learn better pronunciation through stress on word accent, intonation, and rhythm.
- To train students to use language appropriately for interviews, group discussion and public speaking
- To improve the students' fluency in English, through a well-developed vocabulary and enable them to listen to English spoken at normal conversational speed by educated English speakers and respond appropriately in different socio-cultural and professional contexts.
- Further, they would be required to communicate their ideas relevantly and coherently in writing.

Expected Outcomes:

- Becoming active participants in the learning process and acquiring proficiency in spoken English of the students.
- Speaking with clarity and confidence thereby enhancing employability skills of the students.
- Accomplishment of sound vocabulary and its proper use contextually
- Flair in Writing and felicity in written expression.
- Enhanced job prospects.
- Effective Speaking Abilities.

Cracking
UNIT I: Creating the unknowing passage-Reading Comprehension- Listening Comprehension.

UNIT II: Correction of the Sentences Nouns – Pronouns – Verbs- Tenses- Articles-Prepositions- Sentences.

UNIT III: Competitive Vocabulary – Word Building – Memory techniques

UNIT IV: Functional English – Sentences – Construction – Neutralization of accent – Intonation.

UNIT V: Dynamics of Speaking – Communication Skills – Speech Preparation – Speaking Practices.

Reference books:

1. M. Ashraf Rizvi: **Effective Technical Communication**, Tata McGraw Hill, New Delhi, 2014.
2. Wren and Martin, **High School English Grammar and Composition,** S. Chand Publication, New Delhi, 2014.
3. Hari Mohan Prasad, **Objective English for Competitive Examination,** Tata McGraw Hill, New Delhi, 2014.
4. R.S. Aggarwal , **Objective General English,** S. Chand Publication, New Delhi.
5. R.K Bansal, **Spoken English : Manual of Speech and Phonetics,**4th Edition, Orient Black swan Pvt Ltd.-New Delhi, 2013.

II B.Tech – **I Sem**

15ACE09-GREEN BUILDINGS
(Choice Based Credit Courses (Inter-department))

L T P C
3 1 0 3

UNIT-I Introduction :Concept of Green Building, Need for Green Building, Benefits of Green Buildings, Green Building Materials and Equipment in India, Key Requisites for Constructing a Green Building, Important Sustainable features for Green Building,

UNIT-II Green Building Concepts and Practices Indian Green Building Council, Green Building Moment in India, Benefits Experienced in Green Buildings, Launch of Green Building Rating Systems, Residential Sector, Market Transformation;
Green Building Opportunities And Benefits: Opportunities of Green Building, Green Building Features, Material and Resources, Water Efficiency, Optimum Energy Efficiency, Typical Energy Saving Approach in Buildings, LEED India Rating System and Energy Efficiency,

UNIT-III Green Building Design Introduction, Reduction in Energy Demand, Onsite Sources and Sinks, Maximise System Efficiency, Steps to Reduce Energy Demand and Use Onsite Sources and Sinks, Use of Renewable Energy Sources. Ecofriendly captive power generation for factory, Building requirement,

UNIT-IV Air Conditioning Introduction,CII Godrej Green business centre,Design philosophy,Design interventions,Energy modeling, HVAC System design,Chiller selection,pump selection,Selection of cooling towers,Selection of air handing units,Precooling of fresh air,Interior lighting system,Key feature of the building. Eco-friendly captive power generation for factory,Building requirement.

UNIT-V Material Conservation Handling of non process waste, waste reduction during construction,materials with recycled content,local materials,material reuse,certified wood ,Rapidly renewable building materials and furniture; Indoor Environment Quality And Occupational Health: Air conditioning, Indore air quality, Sick building syndrome, Tobacco smoke control, Minimum fresh air requirements avoid use of asbestos in the building, improved fresh air ventilation, Measure of IAQ, Reasons for poor IAQ, Measures to achieve Acceptable IAQ levels,

Text Books:
1. Handbook on Green Practices published by Indian Society of Heating Refrigerating and Air conditioning Engineers, 2009.

2. Green Building Hand Book by Tomwoolley and Samkimings, 2009.

Reference Books: 1. Complete Guide to Green Buildings by Trish riley
2. Standard for the design for High Performance Green Buildings by Kent Peterson, 2009

II B.Tech – I Sem

15ACE10-DISASTER MANAGEMENT AND MITIGATION
(Choice Based Credit Courses (Inter-department))

L	T	P	C
3	1	0	3

UNIT-I - Introduction To Disaster :Meaning, Nature, Importance of Hazard, Risk, Vulnerability and Disaster- Dimensions & Scope of Disaster Management - India's Key Hazards – Vulnerabilities - National disaster management framework - Disaster Management Cycle.

UNIT-II - Natural Disaster :Natural Disasters- Meaning and nature of natural disaster; their types and effects. Floods, drought, cyclone, earthquakes, landslides, avalanches, volcanic eruptions, Heat and cold waves, Climatic change: global warming, Sea level rise, ozone depletion.

UNIT-III - Anthropogenic DisasteR :Man Made Disasters- Nuclear disasters, chemical disasters, biological disasters, building fire, coal fire, forest fire, oil fire, air pollution, water pollution, deforestation and industrial waste water pollution.

UNIT-IV - Approaches In Disaster Management :Pre- disaster stage (preparedness) - Preparing hazard zonation maps, Predictability/ forecasting & warning - Preparing disaster preparedness plan - Land use zoning - Preparedness through Information, education. Emergency Stage - Rescue training for search & operation - Immediate relief - Assessment surveys. Post Disaster stage – Rehabilitation - Social Aspect - Economic Aspect and Environmental Aspect.

UNIT-V - Disaster Mitigation :Meteorological observatory - Seismological observatory - Hydrology Laboratory and Industrial Safety inspectorate. Technology in Disaster Management - Emergency Management Systems (EMS) in the Disaster Management Cycle - Remote Sensing and Geographic Information Systems(GIS) in Disaster Management. 2

Text Book:

1. Sharma.S.R, "Disaster management", A P H Publishers, 2011.

REFERENCES:

1. VenuGopalRao.K, "Geoinformatics for Disaster Management", Manglam Publishers and Distributors, 2010.
2. Singh.R.B, "Natural Hazards and Disaster Management: Vulnerability and Mitigation", Rawat Publications, 2006.

3. Gupta.H.K, "Disaster Management", University Press, India, 2003.
4. Gupta.M.C, "Manuals on Natural Disaster management in India", National Centre for Disaster Management,IIPA, New Delhi, 2001.

II B.Tech I-sem R15

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY
COLLEGE OF ENGINEERING: PULIVENDULA (AUTONOMOUS)

II Year B.Tech (Civil Engineering) I Semester

T	L	C
1	3	3

15ACE11 – WATER HARVESTING AND CONSERVATION (CBCC)

OBJECTIVE: *The course aims at bringing awareness about the need for conservation of Water. The student will be taught different methods of Water Harvesting and also the methods of Water Conservation. He will also learn the principles of Watershed Management.*

UNIT – I

Origin, Occurrence & Movement of Groundwater:-Introduction-sources of ground water – Hydro geological Cycle – Infiltration – natural openings in rocks – zones of aeration , saturation and water table – classification of ground water – laboratory and field methods of sampling ground water- aquifers – aquifuges- aquicludes – aquitards – ill effects due to lowering of water table -Artificial recharge.

UNIT – II

Water Harvesting: Principles of water harvesting-methods of rainwater harvestingdesign of rainwater harvesting structures-Purification Techniques for direct use-Harvesting of surface runoff-onsite detention basin - ponds - types - Recycling of harvested water

UNIT – III

Water Recovery and Reuse: Perspective on recycle and reuse- factors affecting the development of water reclamation and reuse criteria- elements/components of water reclamation and reuse criteria / guidelines- sewage irrigation- Waste water reclamation-waste water recharge for reuse – Treatment Requirements for Water Reuse-methods.

UNIT – IV

Sustainable Watershed Approach & Watershed Management Practices: Concept of watershed-Introduction to watershed management- Integrated water resources management- natural resources management-agricultural practices-integrated farming-Conjunctive use of water resources-Community participation-Watershed Management Practices in Arid and Semiarid Regions-Case studies-Short term and long term strategic planning.

UNIT – V

Soil and Water Conservation: Scope of soil and water conservation-Mechanics and types of erosion-their causes-Soil erosion control measures - bank protectionvegetative barriers-contour bund- contour trenches-contour stone walls-contour ditchesterraces-outlets and grassed waterways-Gully control structures - temporary and permanent - design of permanent soil conservation structures-Design of farm ponds and percolation ponds.

TEXT BOOKS:

1. Watershed Management by Murty, J.V.S, New Age Intl., New Delhi .
2. Water Resources Conservation and Management by Chatterjee, S. N.,Atlantic Publishers.
3. Ground Water by S.Ramakrishnan, SCITECH Publishers.

REFERENCE BOOKS:

1. Advances in Soil and Water Conservation by Pierce, F.J. and Frye, W. W. (1998):, Ann Arbor Press, Michigan.
2. Soil and Water Conservation Engineering, 4th Ed. By Schwab, G. O., Fangmeier, D. D., Elliot, W. J. and Frevert, R. K. (1993), John Wiley and Sons Inc., USA
3. Watershed Management in India by Murthy, J.V.S., Wiley Eastern, New Delhi, 1994 .
4. Irrigation Water Management - Principles and Practice by Dilip Kumar Majumdar,, PHI Pvt.Ltd.NewDelhi-1.
5. Irrigation and Water Power Engineering by Madan Mohan Das & Mimi Das Saikia, PHI learning Pvt. Ltd., NewDelhi-1

Course Outcomes: *On completion of the course, the student will be able to*

a) Appreciate the importance of Water Conservation

b) Understand the methods of Water Harvesting

c) Understand the principles of Watershed Management and its importance in sustainability

II B.Tech – I Sem

15AEC08-BASIC ELECTRONICS
(Choice Based Credit Courses (Inter-department))

L	T	P	C
3	1	0	3

UNIT – I:
Semiconductor devices: Diode, BJT, their structures and principle of operations.
Amplifiers: Functionality, specifications-voltage gain, current gain, input resistance, output resistance, dynamic range, bandwidth, linearity, power efficiency

UNIT- II:
Power electronics: Half wave and full wave rectification, filtering, regulation with Zener diode and linear regulators.
Filters: Low pass, high pass, band pass and band stop filters, specifications-cutoff frequency, roll off.

UNIT – III
Feedback Amplifiers: Basic concept of negative and positive feedback, application of negative feedback in amplifiers, effect on gain, bandwidth, input resistance, output resistance and de-sensitivity to parameter variations.
Oscillators: Barkhausen criterion, RC phase shift, Wien bridge, Colpitts, Hartley and Crystal oscillators, applications of oscillators.

UNIT – IV
Operational amplifier: Differential mode of operation, common mode rejection, typical op-amp specifications-open loop gain, differential input resistance, unity gain-bandwidth, inverting amplifier, non-inverting amplifier, summing amplifier, Instrumentation Amplifier, concept of active filters.

UNIT – V
Digital electronics: Review of Boolean algebra and signed number representation schemes in binary, implementation of Boolean functions using various logic gates, concept of combinatorial and sequential circuits, registers and counters from functional viewpoint.

Text Books:

1. Electronics Devices and Circuits, J.Millman and Christos. C. Halkias, 3rd edition, Tata McGraw Hill, 2006.
2. Electronics Devices and Circuits Theory, David A. Bell, 5th Edition, Oxford University press., 2008.

References:

1. Electronics Devices and Circuits Theory, R.L.Boylestad,Lousis Nashelsky and K.Lal Kishore, 12th edition, 2006, Pearson, 2006.
2. Electronic Devices and Circuits, K. Lal Kishore, 3rd Edition, BSP, 2008.
3. Electronic Devices and Circuits, N.Salivahanan, and N.Suresh Kumar, 3rd Edition, TMH, 2012

II B.Tech – **I Sem**

15AEC09-FUNDAMENTALS OF DIGITAL ELECTRONICS
(Choice Based Credit Courses (Inter-department))

L	T	P	C
3	1	0	3

UNIT-I:
Binary Systems: Introduction of Digital Computers and Digital Systems, Binary numbers, Base Conversion: Binary, Decimal, Hex, Octal. Complements: R's Complement, 2's and 10's Complement, (R-1)'s Complement, 1's and 9's Complement, Binary Codes: Decimal Codes, Error Detection codes, Reflected Code.

UNIT-II:
Binary Logic And Boolean Algebra: Basic Binary logic, Logic Gates: AND, OR, INVERTER, Postulates, Boolean algebra, Two value Boolean algebra, Basic theorems of Boolean algebra: De-Morgan's Theorems, Boolean functions Boolean forms: Canonical, Standard.

UNIT-III:
Boolean Function Implementation: Need for simplification, K–Map method: 2–Variable K–map, 3–Variable K–map, 4–variable K–map, K–Map using Don't care condition, Universal Gates: NAND, NOR, NAND Implementation, NOR Implementation.

UNIT-IV:
Basic Combinational Logic: Design procedure of combinational logic, Adder: Half Adder, Full Adder, Subtractor, Half Subtractor, Full Subtractor, Code Conversion, BCD – Excess-3 conversion.

UNIT-V:
Combinational Logic Using MSI And LSI: Binary Parallel Adder, Magnitude Comparator: 2 Input Comparator, Decoder: 2–4 Decoder, 3–8 Decoder, Encoder: 4–2 Encoder, 8–3 Encoder, Multiplexer: 4–1 multiplexer, Demultiplexers: 1–4 Demultiplexers.

Text Book:

1. Digital Design, M.Morris Mano & Michel D. Ciletti, 5th Edition, Pearson Education, 1999.
2. Switching theory and Finite Automata Theory, Zvi Kohavi and Nirah K.Jha, 2nd Edition, Tata McGraw Hill, 2005.

Reference Books:

1. Fundamentals of Digital Circuits, Anand Kumar, Prentice-Hall of India, Latest Edition
2. Digital electronics Principles, Malvino & Leech, Tata McGraw-Hills publication, Latest Edition.

II B.Tech – **I Sem**

15AEC10-ELECTRONIC MEASUREMENTS & INSTRUMENTATION

(Choice Based Credit Courses (Inter-department))

L	T	P	C
3	1	0	3

Course objectives for electrical measurements and instrumentation:

1. This course introduces the basic principles of different types of electrical instruments for the Measurement of voltage, current, power factor, power and energy.
2. It also explains the measurements of RLC parameters using bridge principles.
3. The principles of magnetic measurements are also explained.
4. The principle of working of CRO and its applications are explained.

Course outcomes for electrical measurements and instrumentation:

1. Use wattmeters, pf meters, and energy meters in a given circuit.
2. Extend the range of ammeters and voltmeters
3. Measure active power, reactive power, power factor, and energy in both 1-phase and 3-phase circuits
4. Determine the resistance values of various ranges, L and C values using appropriate a.c bridges

UNIT – I:

Fundamentals of Measurements: Introduction, types of measurements, static & dynamic characteristics of measurement system, types of Errors, error sources and remedies.

Multimeter: Principle of measurement of D.C. Voltage and current, A.C. Voltage and current, Resistance, AC and DC sensitivity, Specifications.

UNIT – II:

Fundamentals of Cathode Ray Oscilloscope: Block diagram, CRO probes, Delay line, types of Oscilloscopes. Measurement of: Signal voltage, Current, Phase & Frequency using Lissajous patterns, Industrial applications of CRO.

UNIT – III:

Review of DC Bridges: Wheatstone bridge, Wien Bridge, errors and precautions in using bridges,

AC bridges: Measurement of inductance-Maxwell's bridge, Anderson Bridge. Measurement of capacitance- Shearing Bridge. Kelvin Bridge, Q-meter.

UNIT – IV:

Signal generator-fixed and variable, AF oscillators, function generators, pulse, random noise, sweep waveform generators, and their standards, specifications and principles of working (Block diagram approach).

UNIT – V:

Sensors and Transducers: Active and passive transducers: Measurement of displacement (Resistance, capacitance, inductance; LVDT) Force (strain gauges) Pressure (piezoelectric

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PULIVENDULA - 516 390

transducers) Temperature (resistance thermometers, thermocouples, and thermistors), Velocity, Acceleration, Vibration, pH measurement Signal Conditioning Circuits.

Text Books:

1. A course in electrical & electronic measurements and instrumentation – AK Sawhney, Puneet Sawhney, 4th Edition, Dhanpat Rai & Sons Educational and technical publisher, 2012.
2. Modern Electronic Instrumentation and Measurement Techniques, Albert D.Helfrick and William D.Cooper, Pearson / Prentice Hall of India, 2007

References:

1. Measurement Systems- Application and Design, Ernest O. Doebelin, TMH, 2007.
2. Electronic Instrumentation, H.S.Kalsi, 2nd edition, Tata McGraw Hill, 2004.
3. Principles of Measurements and Instrumentation, Alan. S. Morris, 2nd Edition, Prentice Hall of India, 2003.

II B.Tech – I Sem

15AME11-ROBOTICS
(Choice Based Credit Courses (Inter-department))

L T P C
3 1 0 3

Course objectives

- To design, develop and complete robotic activities and challenges
- This course aims at providing the students the fundamental knowledge of the various subscriptions such as kinematics, Dynamics, controls, sensors, actuators, etc.
- It is aimed to provide adequate background in both analysis and design of robots.

UNIT – I

Fundamentals of Robots: Introduction, definition, classification and history of robotics, robot characteristics and precision of motion, advantages, disadvantages and applications of robots. Introduction to matrix representation of a point in a space a vector in space, a frame in space, Homogeneous transformation matrices, representation of a pure translation, pure rotation about an axis.

UNIT – II

Kinematics of robot: Forward and inverse kinematics of robots- forward and inverse kinematic equations for position and orientation, Denavit-Hartenberg(D-H) representation of forward kinematic equations of robots, The inverse kinematic of robots, Degeneracy and Dexterity, simple problems with D-H representation.

Differential motions and Velocities: Introduction, differential relationship, Jacobian, differential motions of a frame-translations, rotation, rotating about a general axis, differential transformations of a frame. Differential changes between frames, differential motions of a robot and its hand frame, calculation of Jacobian, relation between Jacobian and the differential operator, Inverse Jacobian.

UNIT – III

Control of Manipulators: Open- and Close-Loop Control, the manipulator control problem, linear control schemes, characteristics of second-order linear systems, linear second-order SISO model of a manipulator joint, joint actuators, partitioned PD control scheme, PID Control Scheme, computer Torque control, force control of robotic manipulators, description of force-control tasks, force control strategies, hybrid position/force control, impedance force/torque control.

UNIT – IV

Robot Vision: Industrial applications of vision-controlled robotic systems, process of imaging, architecture of robotic vision system, Image acquisition, description of other components of vision system, image representation, image processing.

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UNIT – V

Robot Cell Design and Programming: Robot cell layouts-Robot centered cell, In-line robot cell, Considerations in work cell design, Work cell control, Inter locks, Error detection, Work cell controller.

Methods of robot programming, WAIT, SIGNAL, and DELAY commands, Robotic languages, VAL system.

Text Books:

1. Industrial Robotics – Mikell P. Groover and Mitchell Weiss, Roger N. Nagel,Nicholas G.Odrey – Mc Graw Hill, 1986.
2. Robotics and control – R K Mittal and I J Nagrath, - Tata Mc Graw Hill

References:

1. Introduction to Robotics – Analysis, System, Applications by Saeed B. Niku, PHI Publications
2. Robot Analysis and Control - H. Asada and J.J.E. Slotine John Willey & Sons.
3. Fundamentals of Robotics: Analysis and control, Robert J. Schilling, Prentice Hall, 1990.
4. A robot Engineering text book – Mohsen shahinpoor, Harper & Row Publishers,1987
5. Introduction to Robotics: Mechanics and Control, John.J.Craig, Addison- Wesley, 1999
6. Robotics: Control, sensing, vision, and intelligence – K.S. FU, R.C. Gonzalez and C.S.G Lee. Mc Graw Hill, 1987.
7. Robotic Engineering an integrated approach- Richard D. Klafter Thomas – PHI publications

Course outcomes

By studying this course, students will be

- Familiar with the history, concept development and key components of robotics technologies.
- Understand basic mathematic manipulation of spatial coordinate representation and transformation.
- Understand and able to solve basic robot forward and inverse kinematic problems.
- Understand and able to solve robotic dynamics, path planning and control problems.
- Able to undertake practical robotics experiments that demonstrate the above skills.

II B.Tech – **I Sem**

15AME12-MECHANICAL MANUFACTURING PROCESSES
(Choice Based Credit Courses (Inter-department))

L	T	P	C
3	1	0	3

Objectives:
The objectives of this course are to introduce to demonstrate the various manufacturing processes. To develop knowledge and importance of surface treatment, processing of powder metals, glass, ceramics plastics. To apply knowledge of basic mathematics to calculate the machining parameters for different machining processes and acquire knowledge on advanced manufacturing processes.

UNIT – I
Surface treatment: Scope, Cleaners, Methods of cleaning, Surface coating types, and ceramic and organic methods of coating, economics of coating. Electro forming, Chemical vapour deposition, thermal spraying, Ion implantation, diffusion coating, Diamond coating and cladding.

UNIT – II
Processing of Powder metals, Glass and Superconductors: Introduction, production of metal powders, compaction of metal powders, sintering, secondary and finishing operations, design considerations for powder metallurgy, Process capabilities, economics of powder metallurgy, forming and shaping of Glass, techniques for strengthening and treating Glass, design considerations for Glass, processing of superconductors.
Processing of ceramics: Applications, characteristics, classification .Processing of particulate ceramics, Powder preparations, consolidation, Drying , sintering, Hot compaction, Area of application , finishing of ceramics.

UNIT – III
Fabrication of Microelectronic devices: Crystal growth and wafer preparation, Film Deposition oxidation, lithography, bonding and packaging, reliability and yield, Printed Circuit boards, computer aided design in microelectronics, surface mount technology, Integrated circuit economics. E-Manufacturing, nanotechnology, and micromachining, High speed Machining

UNIT – IV
Processing Of Plastics, injection and blow moulding, calendaring, thermo forming, compression moulding, transfer moulding, High energy rate forming methods Rapid manufacturing: - Introduction - concepts of rapid manufacturing, information flow for rapid prototyping, classification of rapid prototyping process, sterer holography fused deposition modeling, selective laser sintering, Applications of rapid prototyping process

UNIT – V
Processing of Composites: Composite Layers, Particulate and fiber reinforced composites, Elastomers, Reinforced plastics, MMC, CMC, Polymer matrix composites.

Text Books:

1. Manufacturing Engineering and Technology, Schmid and kalpakjin, Pearson Education.
2. Manufacturing Technology, Foundry forming and welding, Vol I , P.N. Rao,TMH
3. Rapid Prototyping Principles and Applications, RafiqNoorani, Wiely Pub

Reference Books:

1. Production Technology, R.K. Jain, Khanna Publishers, 17th edition, 2012
2. Process and materials of manufacturing -Lindberg, PE
3. Principles of Metal Castings, Rosenthal.
4. Welding Process, Parmar, Khanna publication.
5. Manufacturing Technology, R.K. Rajput, Laxmi Pub

Course Outcomes:

After completion of this course student will be able to

- Understand the principles of processing of various powder metals, glass, ceramics and semiconductors.
- Understand the applications of rapid prototyping and processing of plastics

Suggested Links:

- www.casde.iitb.ac.in/store/events/2003/IAT-Pune.../DFMA.ppt
- www.rose-hulman.edu/~stienstr/ME470/DFA.ppt
- www.design4manufacturability.com/DFM_article.htm
- http://www.learnerstv.com/Free-Engineering-Video-lectures-ltv234-Page1.htm

II B.Tech – I Sem

15AME13-NON-CONVENTIONAL SOURCES OF ENERGY

(Choice Based Credit Courses (Inter-department))

L	T	P	C
3	1	0	3

Course Objective:

- To explain concept of various forms of renewable energy
- To outline division aspects and utilization of renewable energy sources for both domestics and industrial applications
- To analyse the environmental and cost economics of using renewable energy sources compared to fossil fuels.

UNIT - I

Principles Of Solar Radiation: Role and potential of new and renewable source, the solar energy option, Environmental impact of solar power, physics of the sun, the solar constant, extraterrestrial and terrestrial solar radiation, solar radiation on titled surface, instruments for measuring solar radiation and sun shine, solar radiation data.

UNIT-II

Solar Energy Collection: Flat plate and concentrating collectors, classification of concentrating collectors, orientation and thermal analysis, advanced collectors.

Solar Energy Storage And Applications :

Different methods, Sensible, latent heat and stratified storage, solar ponds. Solar Applications solar heating technique, solar distillation and drying, photovoltaic energy conversion.

UNIT-III

Wind Energy : Sources and potentials, horizontal and vertical axis windmills, performance characteristics, Betz criteria

Bio-Mass : Principles of Bio-Conversion, Anaerobic/aerobic digestion, types of Bio-gas digesters, gas yield, combustion characteristics of bio-gas, utilization for cooking, I.C.Engineoperation and economic aspects.

UNIT-IV

Geothermal Energy : Resources, types of wells, methods of harnessing the energy, potential in India.

Ocean Energy : OTEC, Principles utilization, setting of OTEC plants, thermodynamic cycles. Tidal and wave energy: Potential and conversion techniques, mini-hydel power plants, and their economics.

UNIT-V

Direct Energy Conversion: Need for DEC, Carnot cycle, limitations, principles of DEC.

Thermo-electric generators, Seebeck, Peltier and Joule Thomson effects, Figure of merit, materials, applications, MHD generators, principles, dissociation and ionization, hall effect, magnetic flux,

MHD accelerator, MHD Engine, power generation systems, electron gas dynamic conversion, economic aspects.Fuel cells, principles, faraday's law's, thermodynamic aspects, selection of fuels and operating conditions.

Text Books:

1. Renewable energy resources, Tiwari and Ghosal, Narosa.
2. Non-Conventional Energy Sources ,G.D. Rai

References :

1. Renewable Energy Sources, Twidell& Weir
2. Solar Energy, Sukhatme
3. Solar Power Engineering,B.S.Magal Frank Kreith&J.F.Kreith.
4. Principles of Solar Energy, Frank Krieth& John F Kreider.
5. Non-Conventional Energy, Ashok V Desai, Wiley Eastern 6. Non-Conventional Energy Systems, K Mittal , Wheeler.

Course Outcome:

At the end of the course the student will

1. Have knowledge about various renewable energy sources
2. Be able to choose the appropriate renewable energy as an alternate for conventional power in any application.

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II B.Tech – **I Sem**

15AEE08-PRINCIPLES OF ELECTRICAL ENGINEERING

(Choice Based Credit Courses (Inter-department))

L	T	P	C
3	1	0	3

Course objectives for Principles of Electrical Engineering:

1. Students can learn about fundamental concepts circuits, DC, AC Machines.
2. Students can learn about Electrical instruments.
3. Student learn how to apply electrical principles in their applications.
4. Student can able verify theorems such as super position, thevinins and maximum power transfer and the measurements of RLC parameters using bridge principles

UNIT I: Fundamentals of Electrical Circuits

Circuit Concept–R-L-C Parameters -Kirchhoff's Laws – Network Reduction Techniques-Series, Parallel, Series Parallel, Star-to-Delta or Delta-to-Star Transformation. R.M.S, Average Values and Form Factor for Different Periodic Wave Forms – Sinusoidal Alternating Quantities – Phase and Phase Difference. Concept of Power Factor-Concept of Reactance, Impedance, Susceptance and Admittance-Real and Reactive Power, Complex Power. Examples. Star Delta Transformation Technique. Thevenin's, Norton's and Superposition Theorems for D.C Excitations.

UNIT II: DC Machines

Principle of Operation of DC Machines, Constructional features, EMF equation, Types of Generators, Magnetization and load characteristics of DC Generators.

DC motors, Types of DC Motors, Characteristics of DC Motors, Losses and Efficiency, Swinburne's Test, Speed control of DC Shunt and series Motors, Flux and Armature voltage control methods.

UNIT III: Transformers & Induction machines

Principle of Operation of Single Phase transformer, Types, Constructional Features, EMF equation, Phasor Diagrams for no load and loaded conditions, efficiency of Transformer and regulation, OC and SC Tests, predetermination of Efficiency and Regulation (Simple Problems). Concept of rotating field, Principle of Operation of induction motors.

UNIT IV: Special Machines

Principle of operation of Shaded pole motors, Capacitor motors, AC Servo motors, AC Tachometers, Synchros, Stepper motors and its characteristics.

V.Jera

BoS–Chairman

UNIT V: Electrical Measurements

Moving Coil & Moving Iron Instruments (Ammeter & Voltmeter).Dynamometer Type Watt meters & Energy Meters(operating principles).

Course outcomes for Principles of Electrical Engineering:

1. Students able to demonstrate knowledge on fundamental concepts circuits, DC, AC Machines.
2. Students able to demonstrate knowledge on how to measure the electrical quantities using measuring instruments.
3. Students are able to apply electrical principles in their applications.
   Students are able to determine the RLC parameters using bridge principles.

Text Books

1. Network Analysis – A Sudhakar, Shyammohan S.Palli, 3 ed., 2009. TMH.
2. Introduction to Electrical Engineering – M.S.Naidu and S. Kamakshaiah, 2008, TMH.

References:

1. Electric Machines by I.J. Nagrath & D.P. Kothari, Tata Mc Graw – Hill Publishers, 3rd Edition, 2004.
2. Electrical & Electronic Measurement & Instruments by A.K.Sawhney Dhanpat Rai & Co.

Bos-chairman

II B.Tech – **I Sem**

15AEE01-ELECTRICAL ENGINEERING MATERIALS
(Choice Based Credit Courses (Inter-department))

L	T	P	C
3	1	0	3

Course objectives for Electrical Engineering material:

1. To aquire knowledge on general properties of different conductors.
2. To learn the fundamental properties of dielectric materials and high resistivity materials.
3. To gain knowledge on different insulating materials.
4. To learn about different types of wiring and wiring materials.

UNIT-I Conducting Materials:

Introduction – classification of materials – Metals and Non metals, physical, thermal, mechanical and electrical properties of materials – classification of electrical materials – concept of atom – electron configuration of atom, conductors, general properties of conductors, factors effecting resistivity of electrical materials –electrical/mechanical/thermal properties of copper, aluminum, iron, steel, lead, tin and their alloys – applications.

UNIT-II Dielectric Materials And High Resistivity Materials :

Introduction – solid, liquid and gaseous dielectrics, leakage current, permittivity, dielectric constant, dielectric loss – loss angle – loss constant, Breakdown voltage and dielectric strength of – solid, liquid and gaseous dielectrics, effect of break down– electrical and thermal effects ,Polarization – electric, ionic and dipolar polarization. Effect of temperature and Frequency on dielectric constant of polar dielectrics. High Resistivity materials – electrical / thermal / mechanical properties of Manganin, Constantan, Nichrome, Tungsten, Carbon and Graphite and their applications in electrical equipment.

UNIT-III Insulating Materials-I:

Introduction – characteristics of a good electrical insulating materials – classification of insulating materials – electrical, thermal, chemical and mechanical properties of solid insulating materials, electrical, thermal and mechanical properties of, Asbestos, Bakelite, rubber, plastics, thermo plastics. Resins, polystyrene, PVC, porcelain, glass, cotton and paper.

UNIT-IV Insulating Materials-II:

Liquid insulating materials – Mineral oils, synthetic liquids, fluorinated liquids – their Electrical, thermal and chemical properties – transformer oil – properties – effect of moisture on insulation properties Gaseous insulators – classification based on dielectric strength – dielectric loss, chemical stability properties and their applications .

BOS- chairman

UNIT-V Domestic Wiring:

Wiring materials and accessories – Types of wiring – Types of Switches - Specification of Wiring – Stair case wiring - Fluorescent lamp wiring-Godown wiring – Basics of Earthing – single phase wiring layout for a residential building

Course outcomes for Electrical Engineering material:

1. Able to demonstrate the knowledge on different types of electrical materials.
2. Able to evaluate the leakage current, loss angle, permittivity, dielectric constant and loss constant of different dielectrics.
3. Able to understand the fundamentals of different insulating materials

Able to demonstrate knowledge on types of switches and wiring.

Text Books:

1. Electrical engineering materials by G.K. Mittal, Khanna publication 2nd edition.
2. A course in Electrical Engineering Materials by R.K .RAJPUT, Laxmi publications.
3. Electrical technology volume-I by B.L. Theraja, SChand publications.

Reference Books:

1. "An Introduction to electrical engineering materials" by C.S. Indulkar and S. Thiruvengadam, SChand & Company.
2. "Electrical engineering Materials" by T.T.T.I, Madras, Tata McGraw Hill
3. "A course in electrical engineering materials" by S.P. Seth, Dhanapatrai & Sons, New Delhi

V.Seva
BOS-chairman

II B.Tech – I Sem

15AEE09-ELECTRICAL MEASURING INSTRUMENTS

(Choice Based Credit Courses (Inter-department))

L	T	P	C
3	1	0	3

Objective:

Electrical measurements course introduces the basic principles of all measuring instruments. It also deals with the measurement of RLC parameters voltage, current Power factor, power, energy and magnetic measurements and Digital Meters

UNIT- I Measuring Instruments

Classification – Deflecting, Control and Damping Torques – Ammeters and Voltmeters – PMMC, Dynamometer, Moving Iron Type Instruments – Expression for the Deflecting Torque and Control Torque – Errors and Compensations, Extension of range using Shunt and Series Resistance. Cathode Ray Oscilloscope- Cathode Ray tube-Time base generator-Horizontal and Vertical Amplifiers – Application of CRO – Measurement of Phase , Frequency, Current & Voltage- Lissajous Patterns

UNIT – II Measurement Of Power And Energy

Single Phase Dynamometer Wattmeter, LPF and UPF, Double Element and Three Element Dynamometer Wattmeter, Expression for Deflecting and Control Torques. Types of P.F. Meters – Dynamometer and Moving Iron Type – 1-ph and 3-ph Meters. Single Phase Induction Type Energy Meter – Driving and Braking Torques – Errors and Compensations. Three Phase Energy Meter.

UNIT – III Instrument Transformers And Potentiometers

CT and PT – Ratio and Phase Angle Errors – Design Considerations.

Potentiometers: Principle and Operation of D.C. Crompton's Potentiometer – Standardization – Measurement of unknown Resistance, Current, Voltage.

A.C. Potentiometers: Polar and Coordinate types- Standardization – Applications.

UNIT – IV D.C & A.C Bridges

Method of Measuring Low, Medium and High Resistance – Sensitivity of Wheatstone's Bridge – Kelvin's Double Bridge for Measuring Low Resistance, Measurement of High Resistance – Loss of Charge Method. Measurement of Inductance - Maxwell's Bridge, Anderson's Bridge. Measurement of Capacitance and Loss Angle - Desauty Bridge. Wien's Bridge – Schering Bridge.

BOS – chairman

UNIT – V Magnetic Measurements

Ballistic Galvanometer – Equation of Motion – Flux Meter – Constructional Details, Comparison with Ballistic Galvanometer. Determination of B-H Loop Methods of Reversals - Six Point Method – A.C. Testing – Iron Loss of Bar Samples.

Text Books:

1. Electrical & Electronic Measurement & Instruments by A.K.Sawhney Dhanpat Rai & Co. Publications.
2. Electrical Measurements and measuring Instruments – by E.W. Golding and F.C. Widdis, 5th Edition, Reem Publications.

Reference Books:

1. Electronic Instrumentation by H. S. Kalsi, Tata Grawhill Mc, 3rd Edition.
2. Electrical Measurements – by Buckingham and Price, Prentice – Hall
3. Electrical Measurements: Fundamentals, Concepts, Applications – by Reissland, M.U, New Age International (P) Limited, Publishers
4. Electrical & Electronic Measurement & Instrumentation by R. K. Rajput, 2nd Edition, S. Chand & Co.

V. Sarla
BoS -chairman

II B.Tech – **I Sem**

15ACS04-DATA STRUCTURES
(Choice Based Credit Courses (Inter-department))

L	T	P	C
3	1	0	3

UNIT-I

Stacks & Queues: stacks, stacks using dynamic arrays, Queues, circular queues using dynamic arrays, amazing problem, evaluation of expressions.

Linked List: single linked list and chains, representing chains in C, Linked stacks and queues, polynomials, additional list operations, equivalence classes, sparse matrices, double linked list.

UNIT –II

Trees : Introduction, Binary tree, Binary tree traversals , Additional binary tree operations, Threaded binary trees, Heaps, Binary search trees, Selection trees, Forests, Representation of disjoint sets, Counting binary trees.

UNIT-III

Graphs: The graph abstract datatype, Elementary graph operations, Minimam cost spanning trees, Shortest paths and transitive closure.

Sorting: Motivation, Insertion sort, Quick sort, Merge sort , Heap sort, sorting on several keys, list and table sorts, external sorting.

UNIT –IV

Hashing: Introduction, Static hashing, dynamic hashing, Bloom Filters.

Priority Queues: Single ended and double ended priority queues, leftist trees, Binominal Heaps, Fibonacci Heaps, Pairing Heaps, Symmetric Min-Max Heaps, and Interval Heaps.

UNIT-V

Efficient binary search trees: Optimal binary search trees, AVL Trees, RED Black Trees, Splay Trees, M- Way search trees, B-Trees, B+ -Trees.

Text Books:

1. Fundamentals of Data structures in C 2nd edition HOROWITZ , SAHNI, ANDERSON-FREED.

II B.Tech I Sem R15

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANATHAPURAMU
COLLEGE OF ENGINEERING (AUTONOMOUS) :: PULIVENDULA
REGULATION - R15

15ACS11– OBJECT ORIENTED PROGRAMMING (CBCC)

L	T	P	C
3	1	0	3

Learning Objectives:

- This subject will help to improve the analytical skills of object oriented programming
- Overall development of problem solving and critical analysis
- Formal introduction to Java programming language

Learning Outcomes: On successful completion of this course, the student should be able to:

- Show competence in the use of the Java programming language in the development of small to medium-sized application programs that demonstrate professionally acceptable coding and performance standard
- Understand the basic principles of the object-oriented programming
- Demonstrate an introductory understanding of graphical user interfaces, multithreaded programming, and event-driven programming.

Unit-I :

Introduction to Java : Basics of Java programming, Data types, Variables, Operators, Control structures including selection, Looping, Java methods, Overloading, Math class, Arrays in java.

Unit-II :

Objects and Classes : Basics of objects and classes in java, Constructors, Finalizer, Visibility modifiers, Methods and objects, Inbuilt classes like String, Character, StringBuffer, File, this reference.

Unit-III :

Inheritance and Polymorphism : Inheritance in java, Super and sub class, Overriding, Object class, Polymorphism, Dynamic binding, Generic programming, Casting objects, Instance of operator, Abstract class, Interface in java, Package in java, UTIL package.

Unit-IV :

Event and GUI programming : Event handling in java, Event types, Mouse and key events, GUI Basics, Panels, Frames, Layout Managers: Flow Layout, Border Layout, Grid Layout, GUI components like Buttons, Check Boxes, Radio Buttons, Labels, Text Fields, Text Areas, Combo Boxes, Lists, Scroll Bars, Sliders, Windows, Menus, Dialog Box, Applet and its life cycle, Introduction to swing.

Unit-V :

Multithreading in java : Thread life cycle and methods, Runnable interface, Thread synchronization, Exception handling with try-catch-finally, Collections in java, Introduction to JavaBeans and Network Programming.

Text Books:

1 Introduction to Java Programming (Comprehensive Version), Daniel Liang, Seventh Edition, Pearson.

2 Programming in Java, Sachin Malhotra & Saurabh Chaudhary, Oxford University Press.

3 Murach's Beginning Java 2, Doug Lowe, Joel Murach and Andrea Steelman, SPD.

Reference Books:

4 Core Java Volume-I Fundamentals, Eight Edition, Horstmann& Cornell, Pearson Education.

5 The Complete Reference, Java 2 (Fourth Edition), Herbert Schild, TMH.

6 Java Programming, D. S. Malik, Cengage Learning.

II B.Tech – **I Sem**

15ACS08-OPERATING SYSTEMS

L	T	P	C
3	1	0	3

Course Objective

- To make the students understand the basic operating system concepts such as processes, threads, scheduling, synchronization, deadlocks, memory management, file and I/O subsystems and protection.
- To get acquaintance with the class of abstractions afford by general purpose operating systems that aid the development of user applications

Course Outcomes

- Understand what makes a computer system function and the primary PC components.
- Understand past and current trends in computer technology.
- Use basic software applications.
- Add functionality to the exiting operating systems
- Design new operating systems

UNIT I

Operating Systems Overview: Operating system functions, Operating system structure, operating systems Operations, protection and security, Kernel data Structures, Computing Environments, Open- Source Operating Systems

Operating System Structure: Operating System Services, User and Operating-System Interface, systems calls, Types of System Calls, system programs, operating system structure, operating system debugging, System Boot.

Processes: Process concept, process Scheduling, Operations on processes, Inter process Communication, Examples of IPC systems.

UNIT II

Threads: overview, Multicore Programming, Multithreading Models, Thread Libraries, Implicit threading, Threading Issues.

Process Synchronization: The critical-section problem, Peterson's Solution, Synchronization Hardware, Mutex Locks, Semaphores, Classic problems of synchronization, Monitors, Synchronization examples, Alternative approaches.

CPU Scheduling: Scheduling-Criteria, Scheduling Algorithms, Thread Scheduling, Multiple- Processor Scheduling, Real-Time CPU Scheduling, Algorithm Evaluation.

UNIT III

Memory Management: Swapping, contiguous memory allocation, segmentation, paging, structure of the page table.

Virtual memory: demand paging, page-replacement, Allocation of frames, Thrashing, Memory- Mapped Files, Allocating Kernel Memory

Deadlocks: System Model, deadlock characterization, Methods of handling Deadlocks, Deadlock prevention, Detection and Avoidance, Recovery from deadlock.

UNIT IV

Mass-storage structure: Overview of Mass-storage structure, Disk structure, Disk attachment, Disk scheduling, Swap-space management, RAID structure, Stable-storage implementation.

File system Interface: The concept of a file, Access Methods, Directory and Disk structure, File system mounting, File sharing, Protection.

File system Implementation: File-system structure, File-system Implementation, Directory Implementation, Allocation Methods, Free-Space management.

UNIT V

I/O systems: I/O Hardware, Application I/O interface, Kernel I/O subsystem, Transforming I/O requests to Hardware operations.

Protection: Goals of Protection, Principles of Protection, Domain of protection, Access Matrix, Implementation of Access Matrix, Access control, Revocation of Access Rights, Capability- Based systems, Language – Based Protection

Security: The Security problem, Program threats, System and Network threats, Cryptography as a security tool, User authentication, Implementing security defenses, Firewalling to protect systems and networks, Computer–security classifications.

Text Books:

1. Operating System Concepts, Abraham Silberschatz, Peter B. Galvin, Greg Gagne, Ninth Edition, 2012, Wiley.
2. Operating Systems: Internals and Design Principles, Stallings, Sixth Edition, 2009, Pearson Education.

Reference Books:

1. Modern Operating Systems, Andrew S Tanenbaum, Second Edition, PHI.
2. Operating Systems, S.Haldar, A.A.Aravind, Pearson Education.
3. Principles of Operating Systems, B.L.Stuart, Cengage learning, India Edition.
4. Operating Systems, A.S.Godbole, Second Edition, TMH.
5. An Introduction to Operating Systems, P.C.P. Bhatt, PHI.
6. Operating Systems, G.Nutt, N.Chaki and S.Neogy, Third Edition, Pearson Education.
7. Operating Systems, R.Elmasri, A,G.Carrick and D.Levine, Mc Graw Hill.

B.TECH - R15 REGULATIONS

CHOICE BASED CREDIT COURSES (INTER DEPARTMENT)

OFFERED

IN

III YEAR II SEMESTER

w.e.f.

2015 ADMITTED BATCH

DEPARTMENT OF ELECTRICAL & ELECTRONICS ENGINEERING

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

COLLEGE OF ENGINEERING (AUTONOMOUS) :: PULIVENDULA

PULIVENDULA – 516390, Y.S.R. (DIST), ANDHRA PRADESH, INDIA

ANNEXURE-II

Choice Based Credit Course of Inter Department
offered in

B.TECH III YEAR II SEMESTER

BRANCH	SUBJECT CODE	SUBJECT NAME
MATHEMATICS	15ABS18	FUZZY SETS AND APPLICATIONS
	15ABS19	OPTIMIZATION TECHNIQUES
CHEMISTRY	15ABS20	CHEMISTRY ENERGY MATERIALS
	15ABS21	CHEMISTRY OF LIFE
	15ABS22	CHEMISTRY OF POLYMERS AND THEIR APPLICATIONS
CE	15ACE35	REMOTE SENSING & GIS
	15ACE36	ENVIRONMENTAL IMPACT ASSESTMENT & MANAGEMENT
	15ACE37	FINITE ELEMENT METHODS
EEE	15AEE34	RENEWABLE ENERGY SOURCES
	15AEE19	POWER ELECTRONICS
	15AEE35	UTILIZATION OF ELECTRICAL ENERGY
ME	15AME35	OPTIMIZATION TECHNIQUES BY MATLAB
	15AME36	MECHATRONICS & MEMS
	15AME37	AUTOMOTIVE ELECTRONICS
ECE	15AEC34	FUNDAMENTALS OF COMMUNICATION SYSTEMS
	15AEC35	INDUSTRIAL ELECTRONICS
	15AEC36	NEURAL NETWORKS & FUZZY LOGIC
CSE	15ACS35	MOBILE COMPUTING
	15ACS36	OPTIMIZATION TECHNIQUES
	15ACS37	MACHINE LEARNING

III B.Tech II Semester

15ABS18-FUZZY SETS AND APPLICATIONS
(Choice Based Credit Courses (Inter-department))

L	T	P	C
3	1	0	3

Course Objectives:

- *This course aims at providing the student with the basic concepts of Fuzzy sets, along with the properties and applications.*

UNIT – I

Fuzzy sets - basic definitions, α-level sets, convex fuzzy sets.

UNIT – II

Basic operations on fuzzy sets, types of fuzzy sets

UNIT – III

Cartesian products, algebraic products, bounded sum and difference, t-norms and t-conorms. Fuzzy sets in contrast of probability theory.

UNIT – IV

The extension principle - the Zadeh's extension principle, image and inverse image of fuzzy sets.

UNIT – V

Fuzzy numbers, elements of fuzzy arithmetic,Fuzzy relations and fuzzy graphs, composition of fuzzy relations, min-max composition and its properties, fuzzy equivalence relations, fuzzy relational equations, fuzzy graphs.

Course Outcomes: *The student will be able to analyze several real time problems effectively, under fuzziness.*

TEXT BOOKS:

1. Klir, G. J. and Yuan, B. Fuzzy Sets and Fuzzy Logic : Theory and Applications, (Prentice Hall of India, New Delhi, 1997)

REFERENCES:

1. Zimmermann, H. J. Fuzzy set theory and its Applications (Allied publishers Ltd., New Delhi, 1991).
2. M.Ganesh, Introduction to Fuzzy sets and Fuzzy Logic (PHI Publications,2001)

2.7.18

III B.Tech II Semester

15ABS19-OPTIMIZATION TECHNIQUES

(Choice Based Credit Courses (Inter-department))

L	T	P	C
3	1	0	3

Course Objectives:

- *This course aims at providing the student with the basic concepts and several methods of optimization .*

UNIT – I

Linear programming I : Simplex Method

Introduction , Applications of Linear Programming, Standard form of a Linear Programming Problem, Geometry of Linear Programming Problems, Basic Definitions in Linear Programming. Simplex Method, Simplex Algorithm and Two phase Simplex Method.

UNIT – II

Linear programming II : Duality in Linear Programming

Symmetric Primal-Dual Relations, General Primal-Dual Relations, Duality Theorem, Dual Simplex Method and Transportation Problem.

UNIT – III

Non-linear programming: Unconstrained optimization techniques

Introduction: Classification of Unconstrained minimization methods,

Direct Search Methods : Random Search Methods : Random jumping Method, Random Walk method. Grid Search Method

UNIT – IV

Non-linear programming: Constrained optimization techniques

Introduction , Characteristics of a constrained problem, Random Search Methods, complex method, Sequential linear programming, Basic approach in methods of Feasible directions, Zoutendijk's method of feasible directions: direction finding problem, determination of step length, Termination criteria.

UNIT-V

Geometric Programming

Unconstrained Minimization Problems : solution of unconstrained geometric programming using differential calculus and arithmetic-geometric inequality.

Constrained minimization Problems :Solution of a constrained geometric programming problem, primal-dual programming in case of less-than inequalities, geometric programming with mixed inequality constraints.

Course Outcomes: *The student will be able to analyze optimization problems in engineering and technology using various elegant optimization technique.*

2.7.18

TEXT BOOKS:

Singiresu S Rao., Engineering Optimization: Theory and Practices, New Age Int. (P) Ltd. Publishers, New Delhi.

REFERENCES:

1. Chong, E.K.P.and Zak, S. H.. An Introduction to Optimization, John Wiley & Sons, N.Y.
2. Peressimi A.L., Sullivan F.E., Vhl, J.J..Mathematics of Non-linear Programming, Springer – Verlag.

2.7.18

III B.Tech II Semester

15ABS20-CHEMISTRY ENERGY MATERIALS
(Choice Based Credit Courses (Inter-department))

L	T	P	C
3	1	0	3

Course Objectives:

- *To make the student understand basic electrochemical principles such as standard electrode potentials, emf and applications of electrochemical principles in the design of batteries.*
- *To understand the basic concepts of processing and limitations of fossil fuels and Fuel cells & their applications.*
- *To impart knowledge to the students about fundamental concepts of hydrogen storage in different materials and liquification method*
- *Necessasity of harnessing alternate energy resources such as solar energy and its basic concepts.*
- *To understand and apply the basics of calculations related to material and energy flow in the processes.*

UNIT-1: Electrochemical Systems: Galvanic cell, standard electrode potential, application of EMF, electrical double layer, dipole moments, polarization, Batteries-Lead-acid and Lithium ion batteries

UNIT-2: Fuel Cells: Fuel cell working principle, Classification of fuel cells, Polymer electrolyte membrane (PEM) fuel cells, Solid-oxide fuel cells (SOFC), Fuel cell efficiency, Basic design of fuel cell,.

UNIT-3: Hydrogen Storage: Hydrogen Storage, Chemical and Physical methods of hydrogen storage, Hydrogen Storage in metal hydrides, metal organic frame works (MOF), Carbon structures, metal oxide porous structures, hydrogel storage by high pressure methods. Liquifaction method.

UNIT-4: Solar Energy: Solar energy introduction and prospects, photo voltaic (PV) technology, concentrated solar power (CSP), Solar Fuels, Solar cells.

UNIT-5: Photo and Photo electrochemical Conversions: Photochemical cells and applications of photochemical reactions, specificity of photo electrochemical cell, advantage of photoelectron catalytic conversions.

Course Outcome:

- *Ability to perform simultaneous material and energy balances.*
- *Student learn about various electrochemical and energy systems*
- *Knowledge of solid, liquid and gaseous fuels*
- *To know the energy demand of world, nation and available resources to fulfill the demand*
- *To know about the conventional energy resources and their effective utilization*
- *To acquire the knowledge of modern energy conversion technologies*
- *To be able to understand and perform the various characterization techniques of fuels*
- *To be able to identify available nonconventional (renewable) energy resources and techniques to utilize them effectively*

References :

1. **Physical chemistry by** Ira N. Levine
2. **Essentials of Physical Chemistry,** Bahl and Bahl and Tuli.
3. **Inorganic Chemistry,** Silver and Atkins
4. **Fuel Cell Hand Book 7th Edition,** by US Department of Energy (EG&G technical services and corporation)
5. **Hand book of solar energy and applications** by Arvind Tiwari and Shyam.
6. **Solar energy fundamental, technology and systems** by Klaus Jagar et.al.
7. **Hydrogen storage** by Levine Klebonoff

III B.Tech II Semester

15ABS21-CHEMISTRY OF LIFE

(Choice Based Credit Courses (Inter-department))

L	T	P	C
3	1	0	3

Course objectives:

- *To impart knowledge in chemistry to the students about Structure and function of bio-molecules such as protein & nucleic acid, metabolism, and regulation that are particularly relevant to the biological and life sciences.*

UNIT-1: Cell Chemistry:

Introduction to cell as the basic unit of Life; Types of cells; Procaryotes and Eucaryotes – examples; Characteristics of Plant & Animal cells; Structure of Cell and its Organelles and their functions;

A Chemical probe into the Cell: - Cell Walls composition - (G+) & (G-) Procaryotes, Plant and Animal cells i) Minerals ii) Carbohydrates iii) Proteins iv) Lipids v) Nucleic acids vi) Enzymes vii) Vitamins viii) Hormones, etc. their biological functions.

UNIT -2: Lipids and Membranes:

Introduction: Lipid Structure - Acyl glycerol, Phospho glycerides (Phospholipids), ether lipids and sphingolipids. Bio-synthesis of lipids. Biological membranes – their role, structural complexity and compositions; Plasma membrane, Membrane lipids, Membrane proteins; Lipid bilayers, Fluid Mosaic Model of biological membrane. Dyanamic nature of lipid bilayers and membrane. Protein and Glycoprotein components of membrane. Membrane transport pores and channels, active transport and passive transport.

UNIT -3: Enzyme, Catabolic and Anabolic processes:

Definition, classification and nomenclature; Factors affecting the enzyme catalysed reactions. Advantages and limitations of enzymes in organic synthesis – mechanistic aspects of enzyme catalysis – Lock and Key mechanism, Induced – Fit mechanism, Desolvation and Solvation – substitution theory, Three- point attachment rule. Factors affecting the enzyme catalysed reactions. Enzyme selectivity – chemo, regio, diastereo and enatio selectivity – illustration with suitable examples. Regulation of enzyme activity – Allosteric enzymes. Enzyme inhibition – reversible inhibition – competitive, non-competitive and uncompetitive inhibition of enzymes. Immobilised enzymes – immobilization by physical and chemical methods. Co-Enzymes involved in Oxidation-Reduction processes. Role of metal ions in biological processes, physiology of digestion.

Catabolic and Anabolic processes: Energy transfer processes, role and significance of ATP; The electron transport system - Oxidative phosphorylation; Photosynthesis and its mechanism (cyclic and non-cyclic).

UNIT -4: Bio-Chemistry of Carbohydrates, Respiration and Carbohydrate Metabolism:

Bio-Chemistry of Carbohydrates: Classification of Carbohydrates; Stereoisomerism; Optical isomerism; Optical activity projection and perspective formulas; D-glyceride as a reference compound; Cyanohydrin synthesis; Structure of glucose; monosaccharides, disaccharides and polysaccharides; Polysaccharides and Glycoproteins in cells.

Respiration and Carbohydrate Metabolism: Glycolysis and Kreb's Cycle; Physiology of respiration in mammals, respiratory exchange and transport of respiration at cellular level. Interconversion of glycogen and glucose in liver and the role of insulin.

UNIT -5: Chemistry and Bio-Chemistry of Amino Acids & Proteins:

General properties of Amino acids; Proteins - Classification and Function; Structure of Proteins – Primary, Secondary, Tertiary and Quaternary Structure of Proteins. Synthesis of Peptides and Poly Peptides. Determination of Structure of Poly Peptides -N-terminal and C- terminal residue analysis.

Bio-Chemistry of Nucleic Acids: Introduction; Hydrolysis of Nucleic acids; Structure, Physical and Chemical properties of Heterocyclic bases - Adenine, Guanine, Uracil and Thymine; Structure of DNA: Primary, Secondary, Tertiary structures of DNA. A,B,C and Z forms of DNA. Structure of RNA – types of RNA – mRNA, rRNA and tRNA.; Definition and explanation of Replication, Transcription, Translation. Genetic Code – Codons – Protein synthesis.

Course outcome:

Students will gain an understanding of:

- *the chemical basis for biological phenomena and cellular structure*
- *how physiological conditions (esp. the chemistry of water) influence the structures and reactivities of biomolecules*
- *the chemical properties of amino acids, cofactors, and sugar*
- *the basic principles of protein and polysaccharide structure*
- *enzyme kinetics and their application to the elucidation of catalytic mechanisms*
- *constructing reasonable electron-pushing mechanisms for enzyme-catalyzed reactions*
- *the chemical logic of metabolism*
- *nucleic acid structure – building blocks of both DNA and RNA, secondary structures, tertiary structures and higher order packaging of genomic DNA*
- *translation – process for translation of messenger RNA into polypeptides, interpreting the genetic code, mechanism of ribosomal action*

References:

1. ***"Outlines of Bio-Chemistry"***, by E.E. Conn & Stumpf, John Wiley & Sons, New York, **(2000)**.
2. ***"Text Book of Bio-Chemistry"***, by West, Todd et.al, Oxford and & BH Manohar Publishers & Distributers.
3. ***"Priciples of Bio-Chemistry"*** by White, Handler, Smith et.al.
4. ***"Bio-Chemistry"***, by Lehninger, W.H. Freeman and Companies, USA.
5. ***" Bio-Chemistry"*** by L.Stryer and W.H.Freeman and Companies, USA..
6. ***"Organic Chemistry"***, by R.T.Morison and R.N.Boyd, Allyn & Bacon Inc., (printed in Singapore) **(2001)**.

III B.Tech II Semester

15ABS22-CHEMISTRY OF POLYMERS AND THEIR APPLICATIONS

(Choice Based Credit Courses (Inter-department))

L	T	P	C
3	1	0	3

Course Objectives:

The objectives of this course are:

- *To impart the students the knowledge of polymer materials, their formation mechanisms, properties and uses*
- *provides students with an opportunity to identify different types of polymers in our surrounding*
- *introduces hydrogels of polymer networks in drug delivery system and study of surface phenomenon.*
- *introduces students to the practical application of polymers*

UNIT – 1 : Polymers-Basics and Characterization

Basic concepts: monomers, degree of polymerization, linear, branched and network polymers, classification of polymers, Polymerization: condensation, addition and copolymerization, Mechanism of free radical, chain, ionic and coordination polymerization. Average molecular weight concepts: number, weight, viscosity average molecular weights, polydispersity and molecular weight distribution.

Measurement of molecular weight: End group, viscosity, light scattering, osmotic and ultracentrifugation methods, analysis and testing of polymers.

UNIT – 2 : Synthetic Polymers

Addition and condensation polymerization processes – Bulk, Solution, Suspension and Emulsion polymerization.

Preparation and significance, classification of polymers based on physical properties, Thermoplastics, Thermosetting plastics, Fibers and elastomers, General Applications.

Preparation, properties and applications of Polymers based on different types of monomers, Olefin polymers, Diene polymers, nylons,

Urea - formaldehyde, phenol - formaldehyde and melanine Epoxy and Ion exchange resins. Characterization of polymers by IR, NMR, GPC and XRD.

UNIT – 3 : Natural Polymers & Modified cellulosics

Natural Polymers: Chemical & Physical structure, properties, source, important chemical modifications, applications of polymers such as cellulose, lignin, starch, rosin, shellac, latexes, vegetable oils, gums and proteins.

Modified cellulosics: Cellulose esters and ethers such as Ethyl cellulose, CMC, HPMC, cellulose acetals, Liquid crystalline polymers; speciality plastics- PES, PAES, PEEK, PEAK.

UNIT -4: Hydrogels of Polymer networks and Drug delivery

Definitions of Hydrogel, polymer networks, Types of polymer networks, Methods involved in hydrogel preparation, Classification, Properties of hydrogels, Introduction to drug to drug delivery systems including, drug development, regulation, absorption and disposition, routes of administration and dosage forms. Advanced drug delivery systems and controlled release. Applications of hydrogels in drug delivery.

UNIT – 5 : Surface phenomena

Surface tension, adsorption on solids, electrical phenomena at interfaces including electrokinetics, micelles, reverse micelles, solubilization. Application of photoelectron spectroscopy, ESCA and Auger spectroscopy to the study of surfaces.

Course outcome:

Upon successful completion of this course, the students will be able to:

- *differentiate between natural and man-made polymers.*
- *explain polymerization methods*
- *understand polymerization kinetics*
- *understand drug and drug delivery systems and*
- *applications and uses of polymers.*

References :

1. A Text book of Polymer science, Billmayer
2. Organic polymer Chemistry, K.J.Saunders, Chapman and Hall
3. Advanced Organic Chemistry, B.Miller, Prentice Hall
4. Polymer Chemistry – G.S.Mishra
5. Polymer Chemistry – Vasant R. Gowariker, N. V. Viswanathan, Jayadev Sreedhar
6. Physical Chemistry –S. Glasston & K.J Laidler
7. Drug Delivery- Ashim K. Misra

III B.Tech II Semester

15ACE35-REMOTE SENSING & GIS

(Choice Based Credit Courses (Inter-department))

L	T	P	C
3	1	0	3

Course objectives:

- *To Know the concept of photogrammetry.*
- *Analysis of RS and GIS data and interpreting the data for modelling applications.*
- *To educate of GIS in civil engineering field.*

UNIT I

INTRODUCTION TO PHOTOGRAMMETRY:

Principles& types of aerial photograph, geometry of vertical aerial photograph, Scale & Height measurement on single vertical aerial photograph, Height measurement based on relief displacement, Fundamentals of stereoscopy, fiducially points, parallax measurement using fiducially line.

UNIT II

REMOTE SENSING :

Basic concepts and foundation of remote sensing – elements involved in remote sensing, electromagnetic spectrum, remote sensing terminology and units. Energy resources, energy interactions with earth surface features and atmosphere, resolution, sensors and satellite visual interpretation techniques, basic elements, converging evidence, interpretation for terrain evaluation, spectral properties of water bodies, introduction to digital data analysis.

UNIT III

GEOGRAPHIC INFORMATION SYSTEM:

Introduction, GIS definition and terminology, GIS categories, components of GIS, fundamental operations of GIS, A theoretical framework for GIS.

TYPES OF DATA REPRESENTATION:

Data collection and input overview, data input and output. Keyboard entry and coordinate geometry procedure, manual digitizing and scanning, Raster GIS, Vector GIS – File management, Spatial data – Layer based GIS, Feature based GIS mapping.

UNIT IV

GIS SPATIAL ANALYSIS:

Computational Analysis Methods(CAM), Visual Analysis Methods (VAM), Data storage-vector data storage, attribute data storage, overview of the data manipulation and analysis. Integrated analysis of the spatial and attribute data.

UNIT V

WATER RESOURCES APPLICATIONS:

Land use/Land cover in water resources, Surface water mapping and inventory, Rainfall – Runoff relations and runoff potential indices of watersheds, Flood and Drought impact assessment and monitoring, Watershed management for sustainable development and Watershed characteristics. Reservoir sedimentation, Fluvial Geomorphology, water resources management and monitoring, Ground Water Targeting, Identification of sites for artificial Recharge structures, Drainage Morphometry, Inland water quality survey and management, water depth estimation and bathymetry.

Course Outcomes:

On completion of the course the students will have knowledge on

- *Understanding the concept of photogrammetry.*
- *Analysis of RS and GIS data and interpreting the data for modelling applications.*
- *Understand Application of GIS in civil engineering field.*

TEXT BOOKS:

1. Remote Sensing and GIS by B.Bhatta, Oxford University Press,New Delhi.
2. Advanced surveying: Total station GIS and remote sensing – Satheesh Gopi – Pearson publication.

REFERENCE BOOKS:

1. Fundamentals of remote sensing by gorge Joseph , Universities press, Hyderabad.
2. Concepts & Techniques of GIS by C.P.Lo Albert, K.W. Yonng, Prentice Hall (India) Publications.
3. Basics of Remote sensing & GIS by S.Kumar, Laxmi Publications.
4. Remote sensing and GIS by M.Anji reddy ,B.S.Pubiliications,New Delhi.
5. *Remote Sensing and its applications by LRA Narayana University Press 1999.*
6. *GIS by Kang – tsung chang, TMH Publications & Co.,*
7. *Principals of Geo physical Information Systems – Peter A Burragh and Rachael Mc Donnell,Oxford Publishers 2004*

III B.Tech II Semester

15ACE36-ENVIRONMENTAL IMPACT ASSESSMENT & MANAGEMENT

(Choice Based Credit Courses (Inter-department))

L	T	P	C
3	1	0	3

Course objectives:

- *To apply knowledge acquired to the process of environmental impact modeling and prediction as a design tool with application to a number of case studies.*
- *To adapt skills in GIS to environmental management systems*

UNIT I

INTRODUCTION:

Basic concept of EIA : Initial environmental Examination, Elements of EIA, - factors affecting E-I-A Impact evaluation and analysis, preparation of Environmental Base map, Classification of environmental parameters.

UNIT II

EIA METHODOLOGIES:

E I A Methodologies: introduction, Criteria for the selection of EIA Methodology, E I A methods, Ad-hoc methods, matrix methods, Network method Environmental Media Quality Index method, overlay methods and cost/benefit Analysis.

UNIT III

IMPACT OF DEVELOPMENTAL ACTIVITIES AND LAND USE:

Introduction and Methodology for the assessment of soil and ground water, Delineation of study area, Identification of actives. Procurement of relevant soil quality, Impact prediction, Assessment of Impact significance, Identification and Incorporation of mitigation measures. E I A in surface water, Air and Biological environment: Methodology for the assessment of Impacts on surface water environment, Air pollution sources, Generalized approach for assessment of Air pollution Impact.

UNIT IV

ASSEMENT OF IMPACT ON VEGETATION AND WILDLIFE:

Introduction - Assessment of Impact of development Activities on Vegetation and wildlife, environmental Impact of Deforestation – Causes and effects of deforestation.

ENVIRONEMNTAL AUDIT:

Introduction - Environmental Audit & Environmental legislation objectives of Environmental Audit, Types of environmental Audit, Audit protocol, stages of Environmental Audit, onsite activities, evaluation of Audit data and preparation of Audit report.

UNIT V

ENVIRONEMENTAL ACTS (PROTECTION AND PREVENTION):

Post Audit activities, The Environmental protection Act, The water preventation Act, The Air (Prevention & Control of pollution Act.), Wild life Act.Case studies and preparation of Environmental Impact assessment statement for various Industries.

Course outcomes

- *an understanding of current EIA methods and the techniques and tools used.*
- *To develop an understanding of current assessment methods and legislation.*
- *To develop an understanding of current environmental monitoring systems.*

Text Books:

1. Environmental Impact Assessment Methodologies, by Y. Anjaneyulu, B.S. Publication, Sultan Bazar, Hyderabad.
2. Environmental Science and Engineering, by J. Glynn and Gary W. Hein Ke – Prentice Hall Publishers

Reference Books:

1. Environmental Science and Engineering, by Suresh K. Dhaneja – S.K.,Katari & Sons Publication.,New Delhi.
2. Environmental Pollution and Control, by Dr H.S. Bhatia – Galgotia Publication (P) Ltd, Delhi

CBCC ANEXURE-II R-15

III B.Tech II Semester

15ACE37-FINITE ELEMENT METHODS (CBCC)

L	T	P	C
3	1	0	3

Course objectives:

- *To know FEM Principles to displacement*
- *Students will apply matrix in constructions*

UNIT –I

INTRODUCTION: Concepts of FEM – Steps involved – merits & demerits – energy principles – Discretization – Rayleigh –Ritz method of functional approximation.

UNIT –II

PRINCIPLES OF ELASTICITY: Equilibrium equations – strain displacement relationships in matrix form – Constitutive relationships for plane stress, plane strain and Axi-symmetric bodies of revolution with axi-symmetric loading.

UNIT –III

ONE DIMENSIONAL ELEMENTS: Stiffness matrix for bar element – shape functions for one dimensional elements – one dimensional problems. Different types of elements for plane stress and plane strain analysis – Displacement models –generalized coordinates – shape functions – convergent and compatibility requirements– Natural coordinate system

UNIT –IV

GENERATION OF ELEMENT : Generation of element stiffness and nodal load matrices for 3-node triangular element and four noded rectangular elements. Concepts of, isoparametric elements for 2D analysis –formulation of CST element, 4 –Noded and 8-noded iso-parametric quadrilateral elements –Lagrangian and Serendipity elements.

UNIT-V

AXI-SYMMETRIC ANALYSIS: Basic principles-Formulation of 4-noded iso-parametric axi-symmetric element – Numerical Integration, Static condensation, assembly of elements and solution techniques for static loads.

Course Outcomes:

- *Students can ~~understand~~ FEM Principles*
- *Students can apply matrix in construction*

TEXT BOOK:

1. Finite Elements Methods in Engineering by Tirupati. R. Chandrnpatla and Ashok D. Belegundu – Pearson Education Publications.
2. Finite element analysis by S.S. Bhavakatti-New age internationalpublishers
3. Finite Element methods for Engineers by U.S.Dixit, Cengage Publishers, New Delhi.
4. Finite element analysis in Engineering Design by S.Rajasekharan, S.Chand Publications, New Delhi.
5. Finite Element analysis – Theory & Programming by C.S.Krishna Murthy- Tata Mc.Graw Hill Publishers

REFERENCES:

1. Concepts and Applications of Finite Element Analysis by Robert D.Cook, David S. Malkus and Michael E.Plesha. Jhon Wiley & Sons.
2. Finite element analysis by David V Hutton, Tata Mcgraw Hill, New Delhi
3. Applied Fem by Rammurthy, I.K.International Publishers PVt. Ltd., New Delhi.
4. Fem by J.N.Reddy, Mcjraw, TMH Publications, New Delhi.

CBCC ANEXURE-II R-15

III B.Tech II Semester

15AEE19-POWER ELECTRONICS

(Choice Based Credit Courses (Inter-department))

L	T	P	C
3	1	0	3

Course Objectives:

- *The basic power semiconductor switching devices and their principles of operation..*
- *This course covers characteristics of semi conductor devices, ac-dc, dc-dc, ac-ac and dc-ac converters.*
- *The importance of using pulse width modulated techniques to obtain high quality power supply is also discussed in detail in this course.*

UNIT – I POWER SEMI CONDUCTOR DEVICES

Power Semiconductor Diodes, Thyristors – Silicon Controlled Rectifiers (SCR's) – BJT – Power Transistor - Power MOSFET – Power IGBT - TRIACs, GTOs - Characteristics and Principles of Operation and other Thyristors – Basic Theory of Operation of SCR – Static Characteristics – Turn On and Turn Off Methods- Dynamic Characteristics of SCR - Two Transistor Analogy – Triggering Circuits – Series and Parallel Connections of SCR's – Snubber Circuits – Specifications and Ratings of SCR's, BJT, IGBT - Numerical Problems –Commutation Circuits.

UNIT – II PHASE CONTROLLED CONVERTERS

Phase Control Technique – Single Phase Line Commutated Converters – Mid Point and Bridge Connections – Half Controlled Converters, Fully Controlled Converters with Resistive, RL and RLE loads– Derivation of Average Load Voltage and Current – Line Commutated Inverters - Active and Reactive Power Inputs to the Converters without and with Free Wheeling Diode, Effect of Source Inductance – Numerical Problems.

Three Phase Line Commutated Converters – Three Pulse and Six Pulse Converters – Mid Point and Bridge Connections - Average Load Voltage with R and RL Loads – Effect of Source Inductance–Dual Converters (Both Single Phase and Three Phase) - Waveforms –Numerical Problems.

UNIT – III DC – DC CONVERTERS

Buck converters, boost converters and buck boost converters. Steady state analysis, voltage and current ripple, design of inductor and capacitor values.

UNIT – IV INVERTERS

Inverters – Single Phase Inverter – Basic Series Inverter – Basic Parallel Capacitor Inverter Bridge Inverter – Waveforms –sine-triangle PWM, Three Phase VSI in 120^0 And 180^0 Modes of Conduction. unipolar, bipolar inverter PWM techniques selective harmonic elimination - Voltage Control Techniques for Inverters Pulse Width Modulation Techniques – Numerical Problems.

UNIT – V AC VOLTAGE CONTROLLERS & CYCLO CONVERTERS

AC Voltage Controllers – Single Phase Two SCR's in Anti Parallel – With R and RL Loads – Modes of Operation of Triac – Triac with R and RL Loads – Derivation of RMS Load Voltage, Current and Power Factor Wave Forms – Firing Circuits -Numerical Problems - Thyristor Controlled Reactors; Switched Capacitor Networks.

V. Sud
BOS - chairman

Cyclo Converters – Single Phase Mid Point Cyclo Converters With R and RL loads (Principle of Operation only) – Bridge Configuration Of Single Phase Cyclo Converter with R and RL loads (Principle of Operation only) – Waveforms

Course Outcomes:

- *Basic operating principles of power semiconductor switching devices*
- *The operation of power electronic converters, choppers, inverters, AC voltage controllers, and cycloconverters, and their control.*
- *To understand the working of inverters and application of PWM techniques for voltage control and harmonic mitigation.*
- *How to apply the learnt principles and methods to practical applications.*

TEXT BOOKS:

1. Power Electronics – by M. D. Singh & K. B. Kanchandhani, Tata Mc Graw – Hill Publishing Company, 1998.
2. Power Electronics : Circuits, Devices and Applications – by M. H. Rashid, Prentice Hall of India, 2nd edition, 1998

REFERENCE BOOKS:

1. Power Electronics – by P. S. Bimbra, Khanna Publications.
2. Power electronics, Essentials and applications – L. Umanand Wiley Publications
3. Power Electronics – by Vedam Subramanyam, New Age International (P) Limited, Publishers
4. Power Electronics - by V. R. Murthy , 1st edition -2005, OXFORD University Press
5. Power Electronics-by P. C. Sen, Tata Mc Graw-Hill Publishing.
6. The power electronics (hand book) : Timothy L. Skgarnina
7. Theory of Power Electronics- by KL Rao, Ch Sai Babu, S Chand Publications Revised Edition 2009

V. [illegible]
Bos-chairman

III B.Tech II Semester

15AEE34-RENEWABLE ENERGY SOURCES

(Choice Based Credit Courses (Inter-department))

L	T	P	C
3	1	0	3

Course Objectives:

This course enables the students to

- *Identify the use of renewable energy sources for electrical power generation*
- *Know the environmental effects of energy conversation*
- *Analyze the different types of turbines for ocean energy conversations*
- *Understand the concept of fuel cells and preventive measurements on pollution*

UNIT-I:

Photo voltaic power generation ,spectral distribution of energy in solar radiation, solar cell configurations, voltage developed by solar cell, photo current and load current, practical solar cell performance, commercial photo voltaic systems, test specifications for PV systems, applications of super conducting materials in electrical equipment systems.

UNIT-II:

Principles of MHD power generation, ideal MHD generator performance, practical MHD generator, MHD technology.

Wind Energy conversion: Power from wind, properties of air and wind, types of wind Turbines, operating characteristics.

UNIT-III:

Tides and tidal power stations, modes of operation, tidal project examples, turbines and generators for tidal power generation.

Wave energy conversion: properties of waves and power content, vertex motion of Waves, device applications. Types of ocean thermal energy conversion systems Application of OTEC systems examples,

UNIT-IV:

Miscellaneous energy conversion systems: coal gasification and liquifaction, biomass conversion, geothermal energy, thermo electric energy conversion, principles of EMF generation, description of fuel cells, Co-generation and energy storage, combined cycle co-generation, energy storage.

Global energy position and environmental effects: energy units, global energy position.

UNIT-V:

Types of fuel cells, H_2-O_2 Fuel cells, Application of fuel cells – Batteries, Description of batteries, Battery application for large power. Environmental effects of energy conversion systems, pollution from coal and preventive measures steam stations and pollution, pollution free energy systems.

V. Sarla
BOS-chairman

Course Outcomes:

The student will have the knowledge on the following concepts

- *Find different renewable energy sources to produce electrical power*
- *Solar radiation on earth surface and concept of photo voltaic cells.*
- *Find the various types of turbines and design of energy systems*
- *Estimate the global energy position on miscellaneous energy conversation systems.*

TEXT BOOKS:

1. "Energy conversion systems" by Rakosh das Begamudre, New age International publishers, New Delhi - 2000.
2. John twidell & wier, renewable energy sources, CRC press, 2009.
3. G. D. Rai – non conventional sources, Khanna Publishers.

References books:

1. D.P Kothari, Rakesh Ranjan, renewable energy sources and emerging technologies, PHI, 2009.
2. C.S Solaniki, solar Photo Voltaic- Fundamentals-Principals and applications, PHI 2009

G. Jeevan

Bos- chairman

III B.Tech II Semester

15AEE35-UTILIZATION OF ELECTRICAL ENERGY

Choice Based Credit Courses (Inter-department))

L	T	P	C
3	1	0	3

Course Objectives:

This course enables the students to

- *Understand different types of heating and welding techniques.*
- *Study the basic principles of illumination and its units of Illumination.*
- *Understand different lighting design schemes for various applications.*
- *Learn basic principles of traction system & speed time curves for different traction system.*
- *Understand the fundamentals of environmental aspects of hybrid electric vehicles.*
- *Study the concepts of economic aspects of utilizing electrical energy.*

UNIT–I ILLUMINATION:

Definition – Laws of Illumination–Polar Curves – Calculation of MHCP and MSCP. Lamps: Incandescent Lamp, Sodium Vapour Lamp, Fluorescent Lamp. Requirement of Good Lighting Scheme – Types, Design and Calculation of Illumination. Street Lighting and Factory Lighting – Numerical Problems.

UNIT–II ELECTRIC HEATING & WELDING:

Electrical Heating: Advantages. Methods of Electric Heating – Resistance, Arc, Induction and Dielectric Heating.

Electric Welding: Types – Resistance, Electric Arc, Gas Welding. Ultrasonic, Welding Electrodes of Various Metals, Defects in Welding.

Electrolysis - Faraday's Laws, Applications of Electrolysis, Power Supply for Electrolysis.

UNIT–III INTRODUCTION TO HYBRID ELECTRIC VEHICLES:

History of hybrid and electric vehicles, social and environmental importance of hybrid and electric vehicles, impact of modern drive-trains on energy supplies.

UNIT–IVELECTRIC TRACTION:

Introduction – Systems of Electric Traction. Comparison Between A. C And D. C Traction – Special Features of Traction Motors - Methods of Electric Braking – Plugging, Rheostatic and Regenarative Types. Mechanics of Train Movement. Speed-Time Curves of Different Services – Trapezoidal and Quadrilateral, Speed-Time Curves – Numerical Problems. Calculations of Tractive Effort, Power, Specific Energy Consumption - Effect of Varying Acceleration and Braking Retardation, Adhesive Weight and Coefficient of Adhesion – Problems.

V. Sudha

BOS-Chairman

UNIT–V ECONOMIC ASPECTS OF UTILISING ELECTRICAL ENERGY:

Power Factor Improvement, Improvement of Load Factor, Off Peak Loads- Use of Exhaust Steam, Waste Heat Stations, Pit Head Generation, Diesel Plant, General Comparison of Private Plant and Public Supply- Initial Cost and Efficiency, Capitalization of Losses, Choice of Voltage, Cost of Renewals.

Course Outcomes:

The students will have knowledge on the following concepts to:

- *Identify most appropriate heating & welding techniques for suitable applications*
- *Design the levels of illumination based on the applications*
- *Determine speed-time curves, acceleration & retardation of different traction services.*
- *Estimate energy consumption levels at various modes of operation in traction systems*
- *Identify the economic aspects of utilizing electrical energy*

TEXT BOOKS:

1. Utilization of Electric Energy – by E. Openshaw Taylor and V. V. L. Rao, Universities Press.
2. Art & Science of Utilization of electrical Energy – by Partab, Dhanpat Rai & Co.
3. Utilization of Electrical Energy & Traction – J.B.Gupta, Rajeev Manglik,Rohit Manglik – Published by S.K Kataria & Sons.

REFERENCE BOOKS:

1. Utilization of Electrical Power including Electric drives and Electric traction – by N.V.Suryanarayana, New Age International (P) Limited, Publishers, 1996.
2. Utilization of Electrical Power – by R. K. Rajput, Laxmi Publications
3. Generation, distribution and utilization of electrical energy by C.L Wadhwa,wiley Eastern Limited-1993
4. Electrical Power,S.L Uppal Khanna Publisher – 1988.

BoS-chairman

III B.Tech II Semester

15AME35-Optimization Techniques by MATLAB
(Choice Based Credit Courses (Inter-department))

L	T	P	C
3	1	0	3

Course objective:

To engage in learning of optimization principles, be able to effectively setup and solve real-world optimization problems, and develop technical and communication skills. The course also aims to teach how to use computer programs such as MATLAB to solve mathematical models.

UNIT I

Introduction to MAT LAB: Overview, MATLAB Preliminaries, Basics of MATLAB, Beyond the Basics of MATLAB, Popular Functions and Commands, Plotting using MATLAB, Optimization with MATLAB.

UNIT II

Introduction to Optimization: Statement of an optimization problem, Classifications of optimization Problems: Single variable optimization, Multi variable optimization with no constraints, Multi variable optimization with equality constraints, Multi variable optimization with inequality constraints, Convex and Concave programming.

UNIT III

Single Variable Optimization: Finite difference method, Central difference method, Runge-Kutta method, interval halving method, golden section method with MATLAB code.

UNIT IV

Multi Variable Optimization: Conjugate gradient method, Newton's method, Powell's method, Flectcher- Reeves method, Hook and Jeeves method, interior penalty function with MATLAB code.

UNIT V

Evolutionary Algorithms: Overview, Genetic Algorithms: Basics of Genetic Algorithms, Options in MATLAB, Multi Objective Optimization using Genetic Algorithms, Ant Colony Optimization, Simulated Annealing, Particle Swarm Optimization.

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Course Outcomes:

after completion of this course the student can be able to,

- Define and use optimization terminology and concepts, and understand how to classify an optimization problem.
- know the Application of Optimization Methods to Engineering Problems.
- implement basic optimization algorithms in a computational setting and apply existing optimization software packages (MATLAB) to solve engineering problems.

Text books:

1. "MATLAB An introduction with applications" Rao V.Dukkipati, New age international publications.
2. "Optimization in practice with MATLAB" Achille Messac, Cambridge University Press.
3. "Introduction to optimum design" Jasbir S Arora, Academic Press, Elsevier Publications.

References:

1. "MATLAB Optimization Techniques" Cesar Perez Lopez, Academic press, Springer publications.
2. "Applied Numerical Methods with MATLAB for Engineers and scientists" Steven C.Chapra. Mc,Graw Hill Publications.
3. "Nonlinear optimization" Benny Yakir, open source from net.

III B.Tech II Semester

15AME36-MECHATRONICS AND MEMS

(Choice Based Credit Courses (Inter-department))

L	T	P	C
3	1	0	3

Course Objectives:

- *To understand the technologies behind modern mechatronic systems.*
- *To provide methodological fundamentals for the development of fully automated system.*
- *To teach students how to develop a robotic or automated system project focusing on the hardware and software integration, and*
- *To apply the acquired knowledge for developing a mechatronic system.*

UNIT – I

Introduction: Definition of Mechatronics, Need for Mechatronics in Industry, Objectives of mechatronics, mechatronics design process, Mechatronics key elements, mechatronics applications – Computer numerical control (CNC) machines, Tool monitoring systems, Flexible manufacturing system (FMS), Industrial Robots, Automatic packaging systems, Automatic inspection systems.

UNIT – II

Sensors: Static characteristics of sensors, Displacement, Position and Proximity Sensors, Force and torque sensors, Pressure sensors, Flow sensors, Temperature sensors, Acceleration sensors, Level sensors, Light sensors, Smart material sensors, Micro and Nano sensors, Selection criteria for sensors.

UNIT – III

Actuators: Mechanical, Electrical, Hydraulic and Pneumatic Actuation systems, Characteristics and their limitations, Design of Hydraulic and Pneumatic circuits, Piezoelectric actuators, Shape memory alloys, Selection criteria for actuators.

UNIT – IV

Microprocessors, Microcontrollers and Programmable Logic Controllers: Architecture of of Microprocessor, Microcontroller and Programmable Logic Controller, PLC Programming using ladder diagrams, logics, latching, sequencing, timers relays and counters, data handling, Analog input/output, selection of -.

UNIT – V

Micro Electro Mechanical Systems (MEMS): History, Effect of scaling, Fabrication Techniques: Oxidation, Physical Vapor disposition, Chemical Vapor Deposition, Lithography, Etching, Wafer bonding, LIGA, DRIE, Applications: Lab on chip.

Course Outcomes

Upon successful completion of this unit, the student will be able to:

- *Define the discipline of mechatronics.*
- *Identify examples of mechatronic systems that are encountered in real life.*
- *Identify the components of a typical mechatronic system.*

Text books:

1. Mechatronics, W.Bolton, Pearson Education
2. Mechatronic System Design, Devadas Shetty and Richard A Kolk, Cengage learning
3. Mechatronics an integrated approach, Clarence W. de Silva, CRC Press
4. Micro Electro Mechanical Systems Design, James J Allen, CRC Press Taylor & Francis group
5. Mechatronics, Ganesh S Hedge, Jones and Bartlett Publishers

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III B.Tech II Semester

15AME37-AUTOMOTIVE ELECTRONICS

(Choice Based Credit Courses (Inter-department))

L	T	P	C
3	1	0	3

Course Objectives:

- *To understand the use of electronics in the automobile.*
- *To appreciate the various electronic and the instrumentation systems used in automobile.*

UNIT 1

Introduction to microcomputer: Microcomputer: Buses, memory, timing, CPU registers; Microprocessor architecture: Initialization, operation codes, program counter, branch and jump instructions, subroutine. Analog to digital converters and Digital to analog converters, sampling, polling and interrupts, digital filters, lookup table.

UNIT 2

Sensors and actuators: Speed sensors, Pressure sensors: Manifold Absolute Pressure sensor, knock sensor, Temperature sensors: Coolant and Exhaust gas temperature, Exhaust Oxygen level sensor, Position sensors: Throttle position sensor, accelerator pedal position sensor and crankshaft position sensor, Air mass flow sensor. Solenoids, stepper motors and relays.

UNIT 3

Electronic engine management system: Electronic engine control: Input, output and control strategies, electronic fuel control system, fuel control modes: open loop and closed loop control at various modes, EGR control, Electronic ignition systems – Spark advance correction schemes, fuel injection timing control.

UNIT 4

Electronic vehicle management system: Cruise control system, Antilock braking system, electronic suspension system, electronic steering control, traction control system, Transmission control, Safety: Airbags, collision avoiding system, low tire pressure warning system.

UNIT 5

Automotive instrumentation system: Input and output signal conversion, multiplexing, fuel quantity measurement, coolant temperature and oil pressure measurement, display devices-LED, LCD, VFD and CRT, Onboard diagnostics(OBD), OBD-II, off board diagnostics.

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Course outcomes:

After completion of this course the student can be able to:

1. *Obtain an overview of automotive components, like sensors, actuators, communication protocols and safety systems employed in today's automotive industry .*
2. *Interface automotive sensors and actuators with microcontrollers.*
3. *Know, the various display devices that are used in automobiles.*

Text Books:

1. Understanding Automotive Electronics, William B Ribbens, Newne Butterworth-Heinermann, 6th edition 2003.
2. Crouse W H, Automobile Elctrical Equipment, McGraw Hill Book Co.Inc, Newyork 2005

References:

1. Bechhold "Understanding Automotive Electronics", SAE, 1998.
2. Robert Bosch "Automotive Hand Book", SAE (5th Edition), 2000.
3. Tom Denton,"Automobile Electrical and Electronic Systems" 3rd edition- Edward Arnold, London - 2004.
4. Eric Chowanietz - 'Automotive Electronics' - SAE International USA – 1995

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CBCC ANEXURE-II R-15

III B.Tech II Semester

15AEC34-FUNDEMENTALS OF COMMUNICATION SYSTEMS
(QUALITATIVE TREATMENT ONLY)
(Choice Based Credit Courses (Inter-department))

L	T	P	C
3	1	0	3

Course Objectives:

1. *To study the fundamental concept of the analog communication systems.*
2. *To analyze various analog modulation and demodulation techniques.*
3. *To know the working of various transmitters and receivers.*
4. *To understand the influence of noise on the performance of analog communication systems, and to acquire the knowledge about information and capacity.*

UNIT- I

Elements of communication systems, need for Modulation, Modulation Methods, Baseband and carrier communication, Amplitude Modulation (AM), Generation of AM signals, Rectifier detector, Envelope detector, sideband and carrier power of AM, Double sideband suppressed carrier (DSB-SC) modulation & its demodulation, Switching modulators, Ring modulator, Balanced modulator, Single sideband (SSB) transmission, VSB Modulation.

UNIT- II

Angle Modulation & Demodulation: Concept of instantaneous frequency, Generalized concept of angle modulation, Bandwidth of angle modulated waves – Narrow band frequency modulation (NBFM); and Wide band FM (WBFM), Phase modulation, Pre-emphasis, & De-emphasis, Illustrative Problems.

UNIT -III

Pulse Analog Modulation Techniques

Pulse analog modulation techniques, Generation and detection of Pulse amplitude modulation, Pulse width modulation, Pulse position modulation.

Multiple Access Techniques

Introduction to multiple access techniques, FDMA, TDMA, CDMA, SDMA: Advantages and applications.

UNIT IV

Digital Communication (Qualitative Approach only)

Pulse Code Modulation, DPCM, Delta modulation, Adaptive delta modulation, Overview of ASK, PSK, QPSK, BPSK and M- PSK techniques

Unit-V

Modern Communication Trends (Qualitative Approach only)

Basics of Spectrum utilizations, Comparison of 2G, 3G, Types of Ethernet, Modems – Types of Modems, 100Mbps, 1Gbps modems, Role of IPV6 in Present trends.

Course Outcomes:

This course provides the foundational education in Analog Communication systems, and applications. The students are provided the learning experience through class room teaching and solving assignment & tutorial problems. At the end of course, students should be able to:

1. *Acquire knowledge on the basic concepts of Analog Communication Systems.*
2. *Analyze the analog modulated and demodulated systems.*
3. *Verify the effect of noise on the performance of communication systems.*
4. *Know the fundamental concepts of information and capacity.*

TEXT BOOKS:

1. Sham Shanmugam, "Digital and Analog Communication Systems", Wiley-India edition, 2006.
2. Wayne Tomasi, Electronic Communications System: Fundamentals Through Advanced, 2nd editions, PHI, 2001.

REFERENCES:

1. Simon Hakin, "Communication Systems," Wiley India Edition, 4th Edition, 2011.
2. Bruce Carlson, & Paul B. Crilly, "Communication Systems – An Introduction to Signals & Noise in Electrical Communication", 5th Edition, McGraw-Hill International Edition, 2010.

III B.Tech II Semester

15AEC35-INDUSTRIAL ELECTRONICS

(Choice Based Credit Courses (Inter-department))

L	T	P	C
3	1	0	3

Course Objective:

1. *To get an overview of semi-conductor devices (such as PN junction diode & Transistor) and their switching characteristics.*
2. *To study the characteristics of AC to DC converters.*
3. *To know about the practical applications Electronics in industries.*

UNIT – I:

SEMICONDUCTOR DEVICES: Scope of industrial Electronics, Semiconductors, Merits of semiconductors, crystalline structure, Intrinsic semiconductors, Extrinsic semiconductors, current flow in semiconductor, Open-circuited p-n junction, Diode resistance, Zener diode, Photoconductors and junction photo diodes, Photo voltaic effect, Light emitting diodes (LED)

UNIT – II:

JUNCTION TRANSISTORS: Introduction, The junction transistor, Conventions for polarities of voltages and currents, Open circuited transistor, Transistor biased in the active region, Current components in transistors, Currents in a transistor, Emitter efficiency, Transport factor and transistor-α, Dynamic emitter resistance, Transistor as an amplifier, Transistor construction, Letter symbols for semiconductor Devices, Characteristic curves of junction transistor in common configuration, static characteristic curves of PNP junction transistor in common emitter configuration, The transistor in common collector Configuration.

UNIT – III:

AC TO DC CONVERTORS: AC to DC converters- Introduction, Classification of Rectifiers, Half wave Rectifiers, Full wave Rectifiers, Comparison of Half wave and full wave rectifiers, Bridge Rectifiers, Bridge Rectifier meter, Voltage multiplying Rectifier circuits, Capacitor filter, LC Filter, Metal Rectifiers, Regulated Power Supplies, Classification of Voltage Regulators, Short period Accuracy of Regulators, Long period Accuracy of Voltage Regulator, Principle of automatic voltage Regulator, Simple D.C. Voltage stabilizer using Zener diode, D.C. Voltage Regulators, Series Voltage Regulators, Complete series voltage regulator circuit, Simple series voltage regulator.

UNIT – IV: INDUSTRIAL APPLICATIONS – I

Resistance welding controls: Introduction, Resistance welding process, Basic Circuit for A.C. resistance welding, Types of Resistance welding, Electronic welding control used in Resistance welding, Energy storage welding.

Induction heating: Principle of induction heating, Theory of Induction heating merits of induction heating, Application of induction heating, High frequency power source of induction heating

Dielectric heating: Principle of dielectric heating, theory of dielectric heating, dielectric properties of typical materials, electrodes used in dielectric heating, method of coupling of electrodes to the R.F. generator, Thermal losses in Dielectric heating, Applications.

UNIT – V: INDUSTRIAL APPLICATIONS - II

Ultrasonics: Introduction, Generation of Ultrasonic waves, Application of Ultrasonic waves, Ultrasonic stroboscope, ultrasonic as means of communication, ultrasonic flaw detection, Optical image on non-homogeneities, ultrasonic study of structure of matter, Dispersive study of structure of matter, Dispersive and colloidal effect of Ultrasonic, Coagulating action of Ultrasonic, separation of mixtures by ultrasoni8c waves, cutting and machining of hard materials by ultrasonic vibrations, Degassing of liquids by ultrasonic waves, Physico-chemical effects of ultrasonics, chemical effects of ultrasonics, Thermal effects of Ultrasonics, soldering and welding by ultrasonics, Ultrasonic Drying

***Course Outcome:** After completion of the course the students will be able to*

a. Get an overview of semi-conductor devices (such as PN junction diode & Transistor) and their switching characteristics.
b. Understand the characteristics of AC to DC converters.
c. Understand about the practical applications Electronics in industries.

Text Books:

1. G. K. Mithal, "Industrial Electronics", Delhi, Khanna Publishers, 2000.
2. J.Gnanavadivel, R.Dhanasekaran, P.Maruthupandi, "Industrial Electronics", Anuradha Publications, 2011.

Reference Books:

1. F. D. Petruzulla, "Industrial Electronics", Singapore, McGraw Hill, 1996.
2. M. H. Rashid, "power Electronics Circuits, Devices and Application", 3rd edition, PHI, 2004.

III B.Tech II Semester

15AEC36-NEURAL NETWORKS & FUZZY LOGIC

(Choice Based Credit Courses (Inter-department))

L	T	P	C
3	1	0	3

Course Objectives:

1. To Know the basics of Neural Networks and essentials of Artificial Neural Networks with Single Layer and Multilayer Feed Forward and Feedback Networks
2. To understand the Applications of Neural Networks in pattern recognition, speech and decision making.
3. To study the basic concepts of Fuzzy Logic, Fuzzy sets and Fuzzy system design implementation.
4. To Know the Associate Memories , FAM neural networks and encoding Adaptive Resource theory- network for ART

UNIT-I

Neural Networks Characteristics: History of Development in neural networks, Artificial neural net terminology, model of a neuron, Topology, Types of learning. Supervised, Unsupervised learning. Basic Learning laws, Hebb's rule, Delta rule, widrow and Hoff LMS learning rule, correlation learning rule instar and ouster learning rules.

UNIT-II

Unsupervised Learning: Competitive learning, K-means clustering algorithm, Kohonen's feature maps. Radial Basis function neural networks- recurrent networks, Real time recurrent and learning algorithm. Introduction to Counter propagation Networks- CMAC Network, ART networks, Application of NN in pattern recognition, optimization, Control, Speech and decision making.

UNIT-III

Neural Network models: neural network models, layers in neural network and their connections. Instar, outstar, weights on connections, threshold function, application- Adaline and madaline. Back propagation: feed forward back propagation network- mapping, layout, training, BPN applications

UNIT-IV

Fuzzy Logic: Basic concepts of Fuzzy logic, Fuzzy vs Crisp set, Linguistic variables, membership functions, operations of Fuzzy sets, Fuzzy if-then rules, Variables inference techniques, defuzzification techniques, basic Fuzzy interference algorithm, application of fuzzy logic , Fuzzy system design implementation , useful tools supporting design.

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UNIT-V

Bidirectional Associative Memory (BAM), inputs and outputs, weights and training. FAM-fuzzy associative memory, association, FAM neural networks, encoding Adaptive Resource theory-network for ART, processing in ART

Course Outcomes: After completion of the course, the student can able to

a. Comprehend the concepts of feed forward neural networks
b. Analyze the various feedback networks
c. Understand the concept of fuzziness involved in various systems and fuzzy set theory.
d. Comprehend the fuzzy logic control and adaptive fuzzy logic and to design the fuzzy control using genetic algorithm.
e. Analyze the application of fuzzy logic control to real time systems.

Text Books:

1. Berkin Riza C and Trubatch, "Fuzzy System design principles- Building Fuzzy IF-THEN rule bases", IEEE Press.
2. Yegna Narayanan, "Artificial Neural Networks". 8th Printing, PHI, 2003.

Reference Books:

1. Simon Haykin, "Neural Networks," Pearson Education.
2. Yen and Langari, "Fuzzy Logic: Intelligence, Control and Information", Pearson Education.

III B.Tech II Semester

15ACS35- MOBILE COMPUTING

(Choice based credit course of inter department)

L	T	P	C
3	1	0	3

Course Objective:

- To make the students understand the basic information about mobile computing and its concepts such as Applications, Impediments, Architecture, New Data Services like GPRS, CSHSD, DECT,Mobile IP Networks, MANET's and Linux for Mobile devices.
- To get acquaintance with the class of abstractions offered by the mobile computing system that develops the User App applications

UNIT-I

Introduction: Mobile Communications, Mobile Computing–Paradigm, Promises/Novel Applications and Impediments and Architecture; Mobile and Handheld Devices, Limitations of Mobile and Handheld Devices. GSM – Services, System Architecture, Radio Interfaces, Protocols, Localization, Calling, Handover, Security, New Data Services, GPRS, CSHSD, DECT.

UNIT–II

Medium Access Control in Wireless (MAC): Motivation for a specialized MAC (Hidden and exposed terminals, Near and far terminals), SDMA, FDMA, TDMA, CDMA. MAC protocols for GSM, Wireless LAN (IEEE802.11), Collision Avoidance (MACA, MACAW) Protocols. **Mobile IP Network Layer:** IP and Mobile IP Network Layers, Packet Delivery and Handover Management, Location Management, Registration, Tunneling and Encapsulation, Route Optimization,DHCP.

UNIT–III

Mobile Transport Layer: Conventional TCP/IP Protocols, Indirect TCP, Snooping TCP, Mobile TCP, Other Transport Layer Protocols for Mobile Networks.

Database Issues: Database Hoarding & Caching Techniques, C–S Computing & Adaptation, Transactional Models, Query processing, Data Recovery Process & QoS Issues.

UNIT–IV

Data Dissemination and Synchronization: Communications Asymmetry, Classification of Data Delivery Mechanisms, Data Dissemination Broadcast Models, Selective Tuning and Indexing Methods, Digital Audio and Video Broadcasting (DAB & DVB). Data Synchronization –Introduction, Software, and Protocols

UNIT-V

Mobile Ad hoc Networks (MANETs): Introduction, Applications & Challenges of a MANET, Routing, Classification of Routing Algorithms, Algorithms such as DSR, AODV, DSDV, etc., Mobile Agents, Service Discovery.

Protocols and Platforms for Mobile Computing: WAP, Bluetooth, XML, J2ME, Java Card, Palm OS, Windows CE, Symbian OS, Linux for Mobile Devices.

Course Outcome:

•Students able to use mobile computing more effectively

• Developing mobile application programs to exploit the mobile operating system

TEXTBOOKS:

1. Raj Kamal, "Mobile Computing", Oxford University Press, 2007, ISBN: 0195686772

REFERENCEBOOKS:

1. Jochen Schiller, "Mobile Communications", Addison-Wesley, Second Edition, 2004.
2. Stojmenovic and Cacute, "Handbook ofWireless Networks and Mobile Computing", Wiley, 2002, ISBN0471419028.
3. Reza Behravanfar, "Mobile Computing Principles: Designing and Developing Mobile Applications with UML and XML", ISBN: 0521817331, Cambridge University Press,Oct 2004,

III B.Tech II Semester

15ACS36- OPTIMIZATION TECHNIQUES
(Choice based credit course of inter department)

L	T	P	C
3	1	0	3

Course Objective:

• To understand the theory of optimization methods and algorithms developed for solving various types of optimization problems.

• To develop and promote research interest in applying optimization techniques in problems of Engineering and Technology.

• To apply the mathematical results and numerical techniques of optimization theory to concrete Engineering problems.

UNIT-I

Introduction to optimization: Requirements for the Application of Optimization Methods, Applications of Optimization in Engineering, Structure of Optimization Problems, Functions of a Single Variable: Properties of Single-Variable Functions, Optimality Criteria, Region Elimination Methods, Polynomial Approximation or Point Estimation Methods.

UNIT-II

Functions of a Several Variables: Optimality Criteria, Direct-Search Methods, Gradient Based Methods, Comparison of Methods and Numerical Results.2013-2014

UNIT-III

Linear Programming: Formulation of Linear Programming Models, Graphical Solution of Linear Programming in Two Variables, Linear Programming in Standard Form, Principles of the SimplexMethod,Applications.

UNIT-IV

Constrained Optimality Criteria: Equality-Constrained Problems, Lagrange Multipliers, Economic Interpretation of Lagrange Multipliers, Kuhn-Tucker Conditions, Kuhn-Tucker Theorems, Saddle point Conditions, Second-Order Optimality Conditions, Generalized Lagrange Multiplier Method, and Generalization of Convex Functions.

UNIT-V

Transformation Methods: Penalty Concept, Algorithms, Codes, and Other Contributions, Method of Multipliers, Constrained Direct Search: Problem Preparation, Adaptations of Unconstrained Search Methods, Random-Search Methods.

Course Outcomes: At the end of the course students will be able to:

• Use various optimization techniques such as Quadratic programming, Dynamic Programming and select the ones most suitable to the problem at hand.

• Subdivide a complex system in to smaller disciplinary models, manage their interfaces and reintegrate them in to an overall system model.

• Rationalize and quantify a system architecture or product design problem by selecting appropriate objective function, design variables, parameters and constraints.

- Interpret the mathematical conditions for optimality and give physical explanation.
- Make recommendations based on solutions, analysis and limitations of models.

TEXTBOOKS:

1. Engineering Optimization- Methods and Applications, A.Ravindran, K. M. Ragsdell, G.V. Reklaitis, Second Edition, Wiley India Edition.

2. Introductory Operation Research- Theory and Applications, H.S. Kasana, K.D. Kumar, Springer International Edition.

REFERENCES:

1. Optimization Methods in Operations Research and Systems Analysis, K.V. Mital and C. Mohan, New Age International (P)Limited, Publishers, Third Edition, 1996.
2. Operations Research, Dr. J.K.Sharma, Mc Millan.

3. Operations Research: An Introduction, H.A. Taha, PHI Pvt. Ltd.,

CBCC ANEXURE-II R-15

III B.Tech II Semester

15ACS37-MACHINE LEARNING

(Choice based credit course of inter department)

L	T	P	C
3	1	0	3

Course Objectives:

1. Machine Learning is the discipline of designing algorithms that allow machines (e.g.,a computer)
2. To learn patterns and concepts from data without being explicitly programmed.
3. This course will be an introduction to the design (and some analysis) of Machine Learning Algorithms, with a modern outlook focusing on recent advances, and examples of real-world applications of Machine Learning algorithms.

UNIT I

Introduction- Well-posed learning problems, Designing a learning system, Perspectives and issues in machine learning.

Concept learning and the general to specific ordering – Introduction, A concept learning task, Concept learning as search, Find-S: finding a maximally specific hypothesis, Version spaces and the candidate elimination algorithm and Their Remarks,

UNIT II

Decision Tree learning – Introduction, Decision tree representation, Appropriate problems and issues for decision tree learning, The basic decision tree learning algorithm, Hypothesis space search in decision tree learning,

Artificial Neural Networks – Introduction, Neural network representation, Appropriate problems for neural network learning, Perceptions, Multilayer networks and the back propagation algorithm with their Remarks.

Evaluation Hypotheses – Motivation, Estimation hypothesis accuracy, Basics of sampling theory, A general approach for deriving confidence intervals, Difference in error of two hypotheses, Comparing learning algorithms.

UNIT III

Bayesian learning – Introduction, Bayes theorem and concept learning, Maximum likelihood and least squared error hypotheses, Maximum likelihood hypotheses for predicting probabilities, Minimum description length principle, Bayes optimal classifier, Gibs algorithm, Naïve Bayes classifier, An example learning to classify text, Bayesian belief networks The EM algorithm.

Computational learning theory–introduction: probably approximately correct (PAC) learning. Sample complexity: quantifying the number of examples needed to PAC learn. Computational complexity of training.Sample complexity for finite hypothesis spaces, kDNF, and kCNF. Sample complexity for infinite hypothesis spaces, Vapnik-Chervonenkis dimension

Genetic Algorithms – Motivation, Genetic Algorithms, An illustrative Example, Hypothesis Space Search, Genetic Programming, Models of Evolution and Learning, Parallelizing Genetic Algorithms

UNIT IV

Learning Sets of Rules – Introduction, Sequential Covering Algorithms, Learning Rule Sets: Summary, Learning First Order Rules, Learning Sets of First Order Rules: FOIL, Induction as Inverted Deduction, Inverting Resolution.

Analytical Learning - Introduction, Learning with Perfect Domain Theories: Prolog-EBG Remarks on Explanation-Based Learning, Explanation-Based Learning of Search Control Knowledge.

UNIT V

Combining Inductive and Analytical Learning – Motivation, Inductive-Analytical Approaches to Learning, Using Prior Knowledge to Initialize the Hypothesis, Using Prior Knowledge to Alter the Search Objective, Using Prior Knowledge to Augment Search Operators.

Reinforcement Learning – Introduction, The Learning Task, Q Learning, Non-Deterministic, Rewards and Actions, Temporal Difference Learning, Generalizing from Examples, Relationship to Dynamic Programming.

Course Outcomes:

1. Develop an appreciation for what is involved in learning from data.
2. Understand a wide variety of learning algorithms.
3. Understand how to apply a variety of learning algorithms to data.
4. Understand how to perform evaluation of learning algorithms and model selection.

TEXT BOOKS:

1. Machine Learning – Tom M. Mitchell, - MGH.
2. Machine Learning: An Algorithmic Perspective, Stephen Marsland, Taylor & Francis (CRC)
3. Bishop.C(2006)pattern recognition and machine learning .Berlin:Springer-Verlag.

REFERENCES:

1. Machine Learning Methods in the Environmental Sciences, Neural Networks, William W Hsieh, Cambridge Univ Press.
2. Richard o. Duda, Peter E. Hart and David G. Stork, pattern classification, John Wiley & Sons Inc., 2001.
3. Chris Bishop, Neural Networks for Pattern Recognition, Oxford University Press, 1995.
4. Baldi.P and Brunak.S(2002) Bioinformatics : A Machine Learning Approach Cambridge:
5. HalDaumé III, A Course in Machine Learning, 2015

Jawaharlal Nehru Technological University Anantapur College of Engineering

Pulivendula –516 390 (A.P) India

B.Tech. in Electronics and Communication Engineering

Course Structure and Syllabi under R19 Regulations

ELECTRONICS & COMMUNICATION ENGINEERING

S.No	Course Name	Category	L-T-P-C
1	Physical Activities -- Sports, Yoga and Meditation, Plantation	MC	0-0-6-0
2	Career Counseling	MC	2-0-2-0
3	Orientation to all branches -- career options, tools, etc.	MC	3-0-0-0
4	Orientation on admitted Branch -- corresponding labs, tools and platforms	EC	2-0-3-0
5	Proficiency Modules & Productivity Tools	ES	2-1-2-0
6	Assessment on basic aptitude and mathematical skills	MC	2-0-3-0
7	Remedial Training in Foundation Courses	MC	2-1-2-0
8	Human Values & Professional Ethics	MC	3-0-0-0
9	Communication Skills -- focus on Listening, Speaking, Reading, Writing skills	BS	2-1-2-0
10	Concepts of Programming	ES	2-0-2-0

B.Tech I Year I Semester

Semester - 1					
S.No	**Course No**	**Course Name**	**Category**	**L-T-P**	**Credits**
1	19ABS06	Linear Algebra and Calculus	BS	3-1-0	4
2	19ABS03	Chemistry	BS	3-0-0	3
3	19ACS01	Problem Solving & Programming	ES	3-1-0	4
4	19AHS01	Communicative English- I	HS	2-0-0	2
5	19AEC01	Electronics & Communication Engineering Workshop	PC	0-0-2	1
6	19ABS04	Chemistry Lab	BS	0-0-3	1.5
7	19ACS02	Problem Solving & Programming Lab	ES	0-0-3	1.5
8	19AHS02	Communicative English – I Lab	HS	0-0-2	1
				Total	**18**

B.Tech I Year II Semester

Semester - 2					
S.No	**Course No**	**Course Name**	**Category**	**L-T-P**	**Credits**
1	19AEC02	Network Theory	ES	3-0-0	3
2	19ABS07	Differential Equations and Vector Calculus	BS	3-1-0	4
3	19ABS09	Applied Physics	BS	3-0-0	3
4	19ACS05	Data Structures	ES	3-0-0	3
5	19AME02	Engineering Workshop	LC	0-0-3	1.5
6	19AME01	Engineering Graphics	ES	1-0-3	2.5
7	19AEC03	Network Theory Lab	ES	0-0-3	1.5
8	19ABS10	Applied Physics Lab	BS	0-0-3	1.5
9	19ACS06	Data Structures Lab	ES	0-0-3	1.5
				Total	**21.5**

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B.Tech II Year I Semester

Semester - 3					
S.No	**Course No**	**Course Name**	**Category**	**L-T-P**	**Credits**
1	19ABS12	Complex Variables & Transforms	BS	3 - 0 - 0	3
2	19AEC04	Electronic Devices & Circuits	PC	3 - 0 - 0	3
3	19AEC06	Switching Theory & Logic Design	PC	3 - 0 - 0	3
4	19AEC07	Signals & Systems	PC	3 - 0 - 0	3
5	19AEE07	Control Systems	PC	3 - 0 - 0	3
6	19AEE05	Electrical Technology	ES	3 - 0 - 0	3
7	19AEC05	Electronic Devices & Circuits Lab	PC	0 - 0 - 3	1.5
8	19AEC08	Signals and Systems Lab	PC	0 - 0 - 2	1
9	19AEE06	Electrical Technology Lab	ES	0 – 0–2	1
10	19AHS04	Constitution of India	MC	3 - 0 - 0	0
				Total	**21.5**

B.Tech II Year II Semester

Semester - 4					
S.No	**Course No**	**Course Name**	**Category**	**L-T-P**	**Credits**
1	19AEC15	Probability Theory & Stochastic Processes	ES	3 - 0 - 0	3
2	19AEC16	Electronic Circuit Analysis and Design	PC	3 - 0 - 0	3
3	19AEC17	EM Waves and Transmission Lines	ES	3 - 0 - 0	3
4	19AEC18	Analog Communications	PC	3 - 0 - 0	3
5	19AEC20	Linear Integrated Circuits & Applications	PC	3 - 0 - 0	3
6	19AEC21	Digital Integrated Circuits & Applications	PC	3 - 0 - 0	3
7	19AEC23	Electronic Circuit Analysis and Design Lab	ES	0 - 0 - 3	1.5
8	19AEC19	Analog Communications Lab	PC	0 - 0 - 2	1
9	19AEC22	Integrated Circuits & Applications Lab	PC	0 - 0 - 2	1
10	19ABS14	Environmental Science	MC	3 - 0 - 0	0
11	19AHS03	Universal Human Values	MC	2 - 0 - 0	2
				Total	**23.5**

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B.Tech III Year I Semester

Semester - 5					
S.No	**Course No**	**Course Name**	**Category**	**L-T-P**	**Credits**
1	19AHS12	English Language Skills	HS	2 - 0 - 0	2
2	19AEC51	Antennas & Wave Propagation	PC	3 - 0 - 0	3
3	19AEC52	Digital Communications	PC	3 -0 - 0	3
4	19AEC53	Computer Architecture and Organization	PC	3 - 1 - 0	4
5	19AEC54	Professional Elective – I	PE	3 - 0 - 0	3
	19AEC54a	Information Theory & Coding			
	19AEC54b	Industrial Electronics			
	19AEC54c	Artificial Intelligence &Neural Networks			
6	19AEC55	Open Elective - I (Inter disciplinary)- ANNEXURE-I	OE	3 - 0 - 0	3
7	19AHS13	English Language Skills Lab	HS	0 - 0 - 3	1.5
8	19AEC56	Digital Communications Lab	PC	0 - 0 - 2	1
9	19AEC59	Socially Relevant Projects (30 hours/sem)	PR	------	1
10	19AHS17	Research Methodology	MC	3 - 0 - 0	0
			Total :		**21.5**

B.Tech III Year II Semester

Semester - 6					
S.No	**Course No**	**Course Name**	**Category**	**L-T-P**	**Credits**
1	19AEC61	Microprocessors & Microcontrollers	PC	3 - 0 - 0	3
2	19AEC62	Digital Signal Processing	PC	3 - 0 - 0	3
3	19AEC63	Microwave Engineering	PC	3 - 0 - 0	3
4	19AEC64	Professional Elective – II	PE	3 - 0 - 0	3
	19AEC64a	Optical Communications			
	19AEC64b	Cellular & Mobile Communications			
	19AEC64c	Machine Learning Techniques			
5	19AEC65	Open Elective -II(Inter disciplinary)-**ANNEXURE-II**	OE	3 - 0 - 0	3
6	19AHS14	Humanities Elective - I	HS	3 - 0 - 0	3
	19AHS14a	MEFA			
	19AHS14b	Entrepreneurship & Innovation Management			
7	19AEC66	Microprocessors & Microcontrollers Lab	PC	0 - 0 - 3	1.5
8	19AEC67	Digital Signal Processing Lab	PC	0 - 0 - 2	1
9	19AEC69	Microwave Engineering Lab	PC	0 - 0 - 2	1
10	19AHS16	Organizational Behavior	MC	3 - 0 - 0	0
11	Industrial Training/ Internship/Research projects in National Laboratories / Academic Institutions*		PR	4 Weeks Summer Internship	
				Total	**21.5**

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B.Tech IV Year I Semester

Semester - 7					
S.No	**Course No**	**Course Name**	**Category**	**L-T-P**	**Credits**
1	19AEC71	VLSI Design	PC	3 - 0 - 0	3
2	19AEC72	Electronic Measurements & Instrumentation	PC	3 - 0 - 0	3
3	19AEC74	Professional Elective –III	PE	3 - 0 - 0	3
	19AEC74a	Radar Systems			
	19AEC74b	RF Circuit design			
	19AEC74c	Bio- Medical Instrumentation			
4	19AEC76	Professional Elective- IV	PE	3 - 0 - 0	3
	19AEC76a	Satellite Communications			
	19AEC76b	Digital Image Processing			
	19AEC76c	DSP Processors& Architectures			
5	19AEC75	Open Elective -III - **ANNEXURE-III**	OE	2 - 0 - 0	2
6	19AHS15	Humanities Elective- II	HS	3 - 0 - 0	3
	19AHS15a	Management Science			
	19AHS15b	Business Environment			
7	19AEC77	VLSI Design Lab	PC	0 - 0 - 3	1.5
8	19AEC78	Industrial Training/ Internship/ Research Projects in National Laboratories/Academic Institutions	PR	--------	2
9	19AEC79	Project Stage – I	PR	---------	2
				Total	**22.5**

B.Tech IV Year II Semester

Semester - 8 (Theory - 2, Lab - 0)					
S.No	**Course No**	**Course Name**	**Category**	**L-T-P**	**Credits**
1	19AEC81	Professional Elective - V (MOOC)	PE	3 – 0 - 0	3
2	19AEC82	Open Elective- IV (MOOC)	OE	3 – 0 - 0	3
3	19AEC89	Project Stage – II	PR	----------	6
				Total	**12**

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ANNEXURE – I

Open Elective I (Interdisciplinary)

Branch	Subject Code	Subject
Humanities	19AHS10	Campus Recruitment Training & Soft Skills
Mathematics	19ABS20	Mathematical Modeling
	19ABS21	Fuzzy Set Theory, Arithmetic and Logic
	19ABS22	Number Theory
Physics	19ABS31	Sensors and Actuators for Engineering Applications
	19ABS32	Physics of Electronic Materials
Chemistry	19ABS41	Chemistry of Energy Materials
	19ABS42	Advanced Polymers and Their Applications
	19ABS43	Marine Chemistry
CIVIL	19ACE55a	Air Pollution and Control
	19ACE55b	Green Buildings
	19ACE55c	Basics of Civil Engineering Materials and Construction Practice
EEE	19AEE55a	Basics of Non-Conventional Energy Sources
	19AEE55b	Electrical Measurements & Sensors
	19AEE55c	Electric Vehicle Engineering
ME	19AME55a	Introduction to Hybrid and Electric Vehicles
	19AME55b	Rapid Prototyping
	19AME55c	Design for Manufacturing and Assembly
	19AME55d	Power Plant Operation and Control
	19AME55e	Smart Materials
	19AME55f	Supply Chain Management
CSE	19ACS55a	Object Oriented Programming Concepts Through Java
	19ACS55b	Introduction to Internet Of Things
	19ACS55c	Introduction to Operating Systems

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ANNEXURE – II

Open Elective II (Interdisciplinary)

Branch	Subject Code	Subject Name
Humanities	19AHS11	Competitive &Spoken English
Mathematics	19ABS23	Integral Transforms And ITS Applications
	19ABS24	Numerical Analysis
	19ABS25	Optimization Techniques
Physics	19ABS33	Functional Nanomaterials For Engineers
	19ABS34	Materials Characterization Techniques
Chemistry	19ABS44	Green Chemistry and Catalysis for Sustainable Environment
	19ABS45	Chemistry of Nanomaterials and Applications
	19ABS46	Environmental Management and Audit
CIVIL	19ACE65a	Remote Sensing and GIS
	19ACE65b	Environmental Impact Assessment
	19ACE65c	Disaster Management and Mitigation
EEE	19AEE65a	Energy Conservation and Management
	19AEE65b	PLC & ITS Applications
	19AEE65c	System Reliability Concepts
ME	19AME65a	Automobile Electronics, Sensors & Drives
	19AME65b	Programming of Robots and Control
	19AME65c	Sensors in Intelligent Manufacturing
	19AME65d	Non-Conventional Sources of Energy
	19AME65e	NEMS & MEMS
	19AME65f	Optimization Techniques Through MAT lab
CSE	19ACS65a	Introduction to Machine Learning
	19ACS65b	Introduction to Computer Networks
	19ACS65c	Web Design and Management

ANNEXURE – III Open Elective III

Branch	Subject Code	Subject Name
CIVIL	19ACE75a	Architecture and town planning
	19ACE75b	Experimental stress analysis
	19ACE75c	Finite element methods
EEE	19AEE75a	Electrical engineering materials
	19AEE75b	Digital signal processors and applications
	19AEE75c	IOT applications in electrical engineering
ME	19AME75a	Special types of vehicles
	19AME75b	Six sigma and lean manufacturing
	19AME75c	Reverse engineering
	19AME75d	Energy auditing
	19AME75e	Introduction to composite materials
	19AME75f	Customer relationship management
ECE	19AEC75a	Embedded systems & IOT
	19AEC75b	Electronic instrumentation
	19AEC75c	Basics of VLSI design
CSE	19ACS75a	Mobile application development
	19ACS75b	Real time operating systems and applications
	19ACS75c	Fundamentals of block chain and applications

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JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS):: PULIVENDULA
DEPARTMENT OF MATHEMATICS
I B.TECH – I SEMESTER (Common to all Branches of Engineering)
(THEORY)

Subject Code	Title of the Subject	L	T	P	C
	Linear Algebra and Calculus	3	1	-	4

COURSE OBJECTIVES	
1	This course will illuminate the students in the concepts of calculus and linear algebra.
2	To equip the students with standard concepts and tools at an intermediate to advanced level mathematics to develop the confidence and ability among the students to handle various real world problems and their applications

COURSE OUTCOMES	
CO1	develop the use of matrix algebra techniques that is needed by engineers for practical applications
CO2	Utilize mean value theorems to real life problems
CO3	familiarize with functions of several variables which is useful in optimization
CO4	Students will also learn important tools of calculus in higher dimensions. Students will become familiar with 2- dimensional coordinate systems
CO5	Students will become familiar with 3- dimensional coordinate systems and also learn the utilization of special functions

Mapping between Course Outcomes and Programme Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1												
CO2												
CO3												
CO4												
CO5												

SYLLABUS

Unit I: Matrix Operations and Solving Systems of Linear Equations **10 hrs**

Rank of a matrix by echelon form, solving system of homogeneous and non-homogeneous equations linear equations. Eigen values and Eigen vectors and their properties, Cayley-Hamilton theorem (without proof), finding inverse and power of a matrix by Cayley-Hamilton theorem, diagonalization of a matrix, quadratic forms and nature of the quadratic forms, reduction of quadratic form to canonical forms by orthogonal transformation.

Unit II: Mean Value Theorems **06 hrs**

Rolle's Theorem, Lagrange's mean value theorem, Cauchy's mean value theorem, Taylor's and Maclaurin's theorems with remainders (without proof);

Unit III: Multivariable calculus **08 hrs**

Partial derivatives, total derivatives, chain rule, change of variables, Jacobians, maxima and minima of functions of two variables, method of Lagrange multipliers for three variables

Unit IV: Double Integrals **08 hrs**

Double integrals, change of order of integration, change of variables, areas enclosed by plane curves

Unit V: Multiple Integrals and Special Functions **08 hrs**

Evaluation of triple integrals, change of variables between Cartesian, cylindrical and spherical polar co-ordinates, Beta and Gamma functions and their properties, relation between beta and gamma functions.

Textbooks:

1. Erwin Kreyszig, Advanced Engineering Mathematics, 10/e, John Wiley & Sons, 2011.
2. B. S. Grewal, Higher Engineering Mathematics, 44/e, Khanna Publishers, 2017.

References:

1. R. K. Jain and S. R. K. Iyengar, Advanced Engineering Mathematics, 3/e, Alpha Science International Ltd., 2002.
2. George B. Thomas, Maurice D. Weir and Joel Hass, Thomas Calculus, 13/e, Pearson Publishers, 2013.
3. Glyn James, Advanced Modern Engineering Mathematics, 4/e, Pearson publishers, 201.

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JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS):: PULIVENDULA
DEPARTMENT OF CHEMISTRY
I B.TECH – II SEMESTER (common to EEE, ECE & CSE)
(THEORY)

Subject Code	Title of the Subject	L	T	P	C
19A53201	Chemistry	3		-	3

COURSE OBJECTIVES	
1	To familiarize engineering chemistry and its applications
2	To train the students on the principles and applications of electrochemistry and polymers
3	To introduce instrumental methods, molecular machines and switches

COURSE OUTCOMES	
CO1	**apply** Schrodinger wave equation to hydrogen and particle in a box, **illustrate** the molecular orbital energy level diagram of different molecular species, **explain** the band theory of solids for conductors, semiconductors and insulators **discuss** the magnetic behaviour and colour of complexes.
CO2	**apply** Nernst equation for calculating electrode and cell potentials, **differentiate** between pH metry, potentiometric and conductometric titrations, **explain** the theory of construction of battery and fuel cells, **solve** problems based on cell potential
CO3	**explain** the different types of polymers and their applications, **explain** the preparation, properties and applications of Bakelite, Nylon-66, and carbon fibres, **describe** the mechanism of conduction in conducting polymers, **discuss** Buna-S and Buna-N elastomers and their applications
CO4	**explain** the different types of spectral series in electromagnetic spectrum, **understand** the principles of different analytical instruments, **explain** the different applications of analytical instruments
CO5	**explain** the band theory of solids for conductors, semiconductors and insulators, **explain**supramolecular chemistry and self assembly, **demonstrate** the application of Rotaxanes and Catenanes as artificial molecular machines

<u>Mapping between Course Outcomes and Programme Outcomes</u>

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1												
CO2												
CO3												
CO4												
CO5												

SYLLABUS

Unit 1: Structure and Bonding Models: (10 hrs)

Planck's quantum theory, dual nature of matter, Schrodinger Wave equation, significance of Ψ and Ψ^2 , applications to hydrogen, particle in a box and their applications for conjugated molecules, molecular orbital theory – bonding in homo- and heteronuclear diatomic molecules – energy level diagrams of O_2 and CO, etc. π-molecular orbitals of butadiene and benzene, calculation of bond order, crystal field theory – salient features – splitting in octahedral and tetrahedral geometry, magnetic properties and colour, band theory of solids – band diagrams for conductors, semiconductors and insulators, role of doping on band structures.

Unit 2: Electrochemistry and Applications: (10 hrs)

Electrodes – concepts, reference electrodes (Calomel electrode, Ag/AgCl electrode and glass electrode) electrochemical cell, Nernst equation, cell potential calculations, numerical problems, potentiometry- potentiometric titrations (redox titrations), concept of conductivity, conductivity cell, conductometric titrations (acid-base titrations), photovoltaic cell – working and applications, photogalvanic cells with specific examples. Electrochemical sensors – potentiometric sensors with examples, amperometric sensors with examples.

Primary cells – Zinc- MnO_2 battery (Laclanche cell), Secondary cells – lead acid and lithium ion batteries- working of the batteries including cell reactions. Fuel cells, hydrogen-oxygen, methanol – oxygen fuel cells – working of the cells- Applications.

Unit 3: Polymer Chemistry:(10 hrs)

Introduction to polymers, functionality of monomers, chain growth and step growth polymerization, coordination polymerization, copolymerization (stereospecific polymerization) with specific examples and mechanisms of polymer formation.

Plastics - Thermoplastics and Thermosettings, Preparation, properties and applications of – Bakelite, carbon fibres, Biodegradable polymers, Conducting polymers – polyacetylene, polyaniline, mechanism of conduction and applications.

Unt 4: Instrumental Methods and Applications: (10 hrs)

Electromagnetic spectrum, Absorption of radiation: Principle and applications of UV-Visible, IR and Basic concepts of Chromatographic techniques and their applications. pH metry, potentiometry and conductometry,

Unit 5: Advanced Engineering Materials:(10 hrs)

(i) Concepts and terms of supra molecular chemistry, complementarity, Basic Lock and Key principle, examples of Supramolecules, Applications of Supra molecules (sensors, catalysts, gas storage, medical and molecular switches)

ii) Semiconducting and Super Conducting materials-Principles and some examples

iii) Electrical Insulators or Dielectric materials: Definition and classification, Characteristics of electrical insulators and applications of electrical insulating materials, Super capacitors.

(iv) Nanochemistry: Introduction, classification of nanomaterials properties and applications of Fullerenes, Carbon nano tubes and Graphines nanoparticles.

Text Books:

1. Engineering Chemistry by KNJayaveera, GVSubba Reddy and C. Ramachandraiah, McGraw Hill Higher Education, Foruth Edition, New Delhi
2. A Text Book of Enigneering Chemistry, Jain and Jain, Dhanapathi Rai Publications, New Delhi

References:

1. A Text book of Engineering Chemistry by K. Sesha Maheswaramma and Mridula Chugh, Pearson's Publications Pvt. Ltd., (PAN India Title)
2. A Text book of Engineering Chemistry by SS Dhara, S. Chand Publications, New Delhi
3. Engineering Chemistry by K.B.Chandra Sekhar, UN.Das and Sujatha Mishra, SCITECH Pubblications India Pvt Limited.
4. A Text book of Engineering Chemistry by Prasanta Rath, B. Rama Devi, Ch.Venkata Ramana Reddy and Subhendu Chakroborty, Cengage learning India Pvt.Ltd.
5. Chemistry of Engineering Materials, C.V.Agarwal, C.Parameswaramurthy and Andranaidu
6. Text Book of Engineering Chemistry, Shashichawla, Dhanapathirai Publications.

① ② ③ ⑤

⑥ ⑦ ⑧ ⑨

Problem Solving and Programming

(Common to All Branches of Engineering)

B. Tech – I Semester **L-T-P-C**
3-1-0-4

Course Objectives:

1. Introduce the internal parts of a computer, and peripherals.
2. Introduce the Concept of Algorithm and use it to solve computational problems
3. Identify the computational and non-computational problems
4. Teach the syntax and semantics of a C Programming language
5. Demonstrate the use of Control structures of C Programming language
6. Illustrate the methodology for solving Computational problems

Outcomes:

Student should be able to

1. Identify the different peripherals, ports and connecting cables in a PC (L2)
2. Illustrate the working of a Computer (L3)
3. Select the components of a Computer in the market and assemble a computer (L4)
4. Solve complex problems using language independent notations (L3)

Unit 1:

Computer Fundamentals: What is a Computer, Evolution of Computers, Generations of Computers, Classification of Computers, Anatomy of a Computer, Memory revisited, Introduction to Operating systems, Operational overview of a CPU.

Introduction to Programming, Algorithms and Flowcharts: Programs and Programming, Programming languages, Compiler, Interpreter, Loader, Linker, Program execution, Fourth generation languages, Fifth generation languages, Classification of Programming languages, Structured programming concept, Algorithms, Pseudo-code, Flowcharts, Strategy for designing algorithms, Tracing an algorithm to depict logic, Specification for converting algorithms into programs.

Unit 2:

Introduction to problem solving: Introduction, the problem-solving aspect, Design and implementation of algorithms – Topdown design, Analysis of Algorithms, the efficiency of algorithms, the analysis of algorithms.

Fundamental algorithms: Exchanging the values of two variables, counting, summation of a set of numbers, factorial computation, sine function computation, generation of the Fibonacci sequence, reversing the digits of an integer.

Learning Outcomes: Student should be able to

1. Solve Computational problems (L3)
2. Apply Algorithmic approach to solving problems (L3)
3. Analyze the algorithms (L4)

Unit 3:

Types, Operators, and Expressions: Variable names, data types and sizes, constants, declarations, arithmetic operators, relational and logical operators, type conversions, increment and decrement operators, bitwise operators, assignment operators and expressions, conditional expressions precedence and order of evaluation.

Input and output: standard input and output, formatted output-Printf, formatted input-Scanf

Control Flow: Statements and blocks, if-else, else-if, switch, Loops-while and for, Loops-Dowhile, break and continue, goto and labels.

Functions and Program Structure: Basics of functions, functions returning non-integers, external variables, scope variables, header variables, register variables, block structure, initialization, recursion, the C processor.

Learning Outcomes: Student should be able to

1. Recognize the programming elements of C Programming language (L1)
2. Select the control structure for solving the problem (L4)
3. Apply modular approach for solving the problem (L3)

Unit 4:

Factoring methods: Finding the square root of a number, the smallest divisor of a number, the greatest common divisor of two integers, generating prime numbers.

Pointers and arrays: Pointers and addresses, pointers and function arguments, pointers and arrays, address arithmetic, character pointers and functions, pointer array; pointers to pointers, Multi-dimensional arrays, initialization of arrays, pointer vs. multi-dimensional arrays, command line arguments, pointers to functions, complicated declarations.

Array Techniques: Array order reversal, finding the maximum number in a set, removal of duplicates from an order array, finding the k^{th} smallest element.

Learning Outcomes: Student should be able to

1. Solve mathematical problems using C Programming language (L3)
2. Structure the individual data elements to simplify the solutions (L6)
3. Facilitate efficient memory utilization (L6)

Unit 5:

Sorting and Searching: Sorting by selection, sorting by exchange, sorting by insertion, sorting by partitioning, binary search.

Structures: Basics of structures, structures and functions, arrays of structures, pointers to structures, self-referential structures, table lookup, typedef, unions, bit-fields.

Some other Features: Variable-length argument lists, formatted input-Scanf, file access, Error handling-stderr and exit, Line Input and Output, Miscellaneous Functions.

Learning Outcomes: Student should be able to

1. Select sorting algorithm based on the type of the data (L4)
2. Organize heterogeneous data (L6)
3. Design a sorting algorithm (L6)

Text Books:

1. Brian W. Kernighan, and Dennis M. Ritchie, "The C Programming Language", 2nd Edition, Pearson.
2. R.G. Dromey, "How to Solve it by Computer". 2014, Pearson.
3. Pradip Dey, and Manas Ghosh, "Programming in C", 2018, Oxford University Press.

Reference Books:

1. RS Bichkar "Programming with C", 2012, Universities Press.
2. Pelin Aksoy, and Laura Denardis, "Information Technology in Theory", 2017, Cengage
3. Byron Gottfried and Jitender Kumar Chhabra, "Programming with C", 4th Edition, 2019, McGraw Hill Education.

Course Outcomes:

1. Construct his own computer using parts (L6).
2. Recognize the importance of programming language independent constructs (L2)
3. Solve computational problems (L3)
4. Select the features of C language appropriate for solving a problem (L4)
5. Design computer programs for real world problems (L6)
6. Organize the data which is more appropriated for solving a problem (L6)

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR
COLLEGE OF ENGINEERING (AUTONOMOUS), PULIVENDULA - 516390, A.P, INDIA.
HUMANITIES & SOCIAL SCIENCES DEPARTMENT

COMMUNICATIVE ENGLISH - 1

Subject Code	Title of the Subject	L	T	P	C
	Communicative English - 1	2	0	0	2

COURSE OBJECTIVES	
1	Facilitates effective listening skills for better comprehension of academic lectures and English spoken by native speakers.
2	Helps to improve speaking skills through participation in activities such as role plays, discussions and structured talks/oral presentations.
3	Imparts effective strategies for good writing and demonstrate the same in summarizing, writing well organized essays, record and report useful information.
4	Provides knowledge of grammatical structures and vocabulary and encourage their appropriate use in speech and writing.

COURSE OUTCOMES	
CO1	Understand the context, topic, and pieces of specific information from social or transactional dialogues spoken by native speakers of English
CO2	Apply grammatical structures to formulate sentences and correct word forms
CO3	Analyze discourse markers to speak clearly on a specific topic in informal discussions
CO4	Evaluate reading/listening texts and to write summaries based on global comprehension of these texts.
CO5	Create a coherent paragraph interpreting a figure/graph/chart/table

Introduction

The course is designed to train students in receptive (listening and reading) as well as productive and interactive (speaking and writing) skills by incorporating a comprehensive, coherent and integrated approach that improves the learners' ability to effectively use English language in academic/ workplace contexts. The shift is from *learning about the language* to *using the language*. On successful completion of the compulsory English language course/s in B.Tech., learners would be confident of appearing for international language qualification/proficiency tests such as IELTS, TOEFL, or BEC, besides being able to express themselves clearly in speech and competently handle the writing tasks and verbal ability component of campus placement tests. Activity based teaching-learning methods would be adopted to ensure that learners would engage in actual use of language both in the classroom and laboratory sessions.

Unit 1

Lesson: On the Conduct of Life: William Hazlitt

Listening: Identifying the topic, the context and specific pieces of information by listening to short audio texts and answering a series of questions. **Speaking:** Asking and answering general questions on familiar topics such as home, family, work, studies and interests; introducing oneself and others. **Reading:** Skimming to get the main idea of a text; scanning to look for specific pieces of information. **Reading for Writing :**Beginnings and endings of paragraphs - introducing the topic, summarizing the main idea and/or providing a transition to the next paragraph. **Grammar and Vocabulary:** Content words and function words; word forms: verbs, nouns, adjectives and adverbs; nouns: countable and uncountable; singular and plural; basic sentence structures; simple question form - wh-questions; word order in sentences.

Learning Outcomes

At the end of the module, the learners will be able to

- understand social or transactional dialogues spoken by native speakers of English and identify the context, topic, and pieces of specific information
- ask and answer general questions on familiar topics and introduce oneself/others
- employ suitable strategies for skimming and scanning to get the general idea of a text and locate specific information
- recognize paragraph structure and be able to match beginnings/endings/headings with paragraphs
- form sentences using proper grammatical structures and correct word forms

Unit 2

Lesson: The Brook: Alfred Tennyson

Listening: Answering a series of questions about main idea and supporting ideas after listening to audio texts. **Speaking:** Discussion in pairs/small groups on specific topics followed by short structured talks. **Reading:** Identifying sequence of ideas; recognizing verbal techniques that help to link the ideas in a paragraph together. **Writing:** Paragraph writing (specific topics) using suitable cohesive devices; mechanics of writing - punctuation, capital letters. **Grammar and Vocabulary:** Cohesive devices - linkers, sign posts and transition signals; use of articles and zero article; prepositions.

Learning Outcomes

At the end of the module, the learners will be able to

- comprehend short talks on general topics
- participate in informal discussions and speak clearly on a specific topic using suitable discourse markers
- understand the use of cohesive devices for better reading comprehension
- write well structured paragraphs on specific topics
- identify basic errors of grammar/ usage and make necessary corrections in short texts

Unit 3

Lesson: The Death Trap: Saki

Listening: Listening for global comprehension and summarizing what is listened to. **Speaking:** Discussing specific topics in pairs or small groups and reporting what is discussed **Reading:** Reading a text in detail by making basic inferences -recognizing and interpreting specific context clues; strategies to use text clues for comprehension. **Writing:** Summarizing - identifying main idea/s and rephrasing what is read; avoiding redundancies and repetitions. **Grammar and Vocabulary:** Verbs - tenses; subject-verb agreement; direct and indirect speech, reporting verbs for academic purposes.

Learning Outcomes

At the end of the module, the learners will be able to

- comprehend short talks and summarize the content with clarity and precision
- participate in informal discussions and report what is discussed
- infer meanings of unfamiliar words using contextual clues
- write summaries based on global comprehension of reading/listening texts
- use correct tense forms, appropriate structures and a range of reporting verbs in speech and writing

Unit4

Lesson: Inspiration: Chindu Yellamma

Listening: Making predictions while listening to conversations/ transactional dialogues without video; listening with video. **Speaking:** Role plays for practice of conversational English in academic contexts (formal and informal) - asking for and giving information/directions. **Reading:** Studying the use of graphic elements in texts to convey information, reveal trends/patterns/relationships, communicate processes or display complicated data. **Writing:** Information transfer; describe, compare, contrast, identify significance/trends based on information provided in figures/charts/graphs/tables. **Grammar and Vocabulary:** Quantifying expressions - adjectives and adverbs; comparing and contrasting; degrees of comparison; use of antonyms

Learning Outcomes

At the end of the module, the learners will be able to

- infer and predict about content of spoken discourse
- understand verbal and non-verbal features of communication and hold formal/informal conversations
- interpret graphic elements used in academic texts
- produce a coherent paragraph interpreting a figure/graph/chart/table
- use language appropriate for description and interpretation of graphical elements

Unit 5
Lesson: Politics and the English Language: George Orwell

Listening: Identifying key terms, understanding concepts and answering a series of relevant questions that test comprehension. **Speaking:** Formal oral presentations on topics from academic contexts - without the use of PPT slides. **Reading:** Reading for comprehension. **Writing:** Writing structured essays on specific topics using suitable claims and evidences. **Grammar and Vocabulary:** Editing short texts –identifying and correcting common errors in grammar and usage (articles, prepositions, tenses, subject verb agreement)

Learning Outcomes
At the end of the module, the learners will be able to

- take notes while listening to a talk/lecture and make use of them to answer questions
- make formal oral presentations using effective strategies
- comprehend, discuss and respond to academic texts orally and in writing
- produce a well-organized essay with adequate support and detail
- edit short texts by correcting common errors

Prescribed Text:

1. English All Round: Communication Skills for Undegurdation Learners Vol. I, Orient BlackSwan Publisers, First Edition 2019, Authored by Y.Prabhavathi, M.Lalitha Sridevi and Ruth Z Hauzel.

Reference Books

- Bailey, Stephen. *Academic writing: A handbook for international students*. Routledge, 2014.
- Chase, Becky Tarver. *Pathways: Listening, Speaking and Critical Thinking.* Heinley ELT; 2nd Edition, 2018.
- Skillful Level 2 Reading & Writing Student's Book Pack (B1) Macmillan Educational.
- Hewings, Martin. *Cambridge Academic English (B2)*. CUP, 2012.
- Oxford Learners Dictionary, 12th Edition, 2011.

I B.Tech I Sem

COURSE NO. - ECE WORKSHOP

L	T	P	C
0	0	2	1

Course Objectives:

- To introduce electronic components, measuring instruments and tools used in electronic workshop.
- To give hands on experience with the use of laboratory equipment.
- To equip with the knowledge of understanding data sheets.
- To give working experience with prototype board, solder and de-solder the electronic components on a project board.
- To introduce EDA tools
- To provide knowledge in understanding working of various communication systems

List of Exercises / Experiments

1. Familiarization/Application of commonly used Electronic Workshop Tools : Bread board, Solder, cables, relays, switches, connectors, fuses, Cutter, plier, screwdriver set, wire stripper, flux, knife/blade, soldering iron, de-soldering pump etc.
2. Familiarization/Application of testing and measuring instruments like Voltmeter, Ammeter, Multimeter, Power Supplies, CRO, DSO, Function Generator, Frequency counter.
3. Familiarization/Identification of electronic components (Resistors, Capacitors, Inductors, Diodes, transistors, IC's etc.) – Functionality, type, size, color coding, package, symbol, cost etc.
4. Testing of electronic components like Resistor, Capacitor, Diode, Transistor etc. using Multimeter.
5. Study of CRO and to i) find the Amplitude and Frequency using CRO Ii) measure the Unknown Frequency & Phase difference using CRO
6. Interpret data sheets of discrete components and IC's, estimation and costing.
7. Introduction to EDA Tools: MULTISIM/PSPICE/TINA schematic capture tool, learning of basic functions of creating a new project, getting and placing parts, connecting placed parts, simulating the schematic, plotting and analyzing the results.
8. Assembling and testing of simple electronic circuits on breadboards, assembling and soldering components on a PCB (Kit Assembling)
9. Familiarization of the following electronic systems
    - Assembling and dismantling of desktop computer/laptop/mobile phones.
    - PA system with different microphones, loud speakers, mixer etc.
10. Demonstrate working of various Communication Systems like Radio receiver, Television and Mobile communication system

References:

1. Dr. B.S. Chowdhry & Ahsan A. Ursani, The First Practical Book on Electronic Workshop, Mehran Infotech Consultants, Hyderabad.
2. Paul Horowitz & Ian Robinson, "Laboratory Manual for Art of Electronics", Cambridge University Press.
3. S M Dhir, Electronic Components & Materials, 2^{nd} Edition, Tata McGraw - Hill Publishing Company Limited
4. Dr.S.K.Bhattacharya, Dr. S.Chatterji, Textbook of Projects in Electrical, Electronics, Instrumentation and Computer Engineering, S. Chand Publishers., New Delhi.
5. Sengupta R., Textbook of Principles and Reliable Soldering Techniques, New Age International Ltd.

Course Outcomes:

- Identify discrete components and ICs
- Perform soldering- de-soldering techniques
- Assemble simple electronic circuits over a PCB
- Perform measurements using various electronic instruments such as Cathode ray oscilloscope, multimeter and function generator
- Testing of various components
- Interpret specifications (ratings) of the component
- Demonstrate working of various communication systems

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS):: PULIVENDULA
****** DEPARTMENT OF CHEMISTRY ******
I B.TECH – II SEMESTER(common to EEE, ECE & CSE)
(CHEMISTRY LAB)

Subject Code	Title of the Lab	L	T	P	C
19A53202	Chemistry lab	-	-	3	1.5

COURSE OBJECTIVES	
1	Verify the fundamental concepts with experiments

COURSE OUTCOMES	
CO1	**determine** the cell constant and conductance of solutions
CO2	**prepare** advanced polymer materials
CO3	**measure** the strength of an acid present in secondary batteries
CO4	**analyse** the IR and NMR of some organic compounds

Mapping between Course Outcomes and Programme Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1												
CO2												
CO3												
CO4												
CO5												

LIST OF EXPERIMENTS

1. Conductometric titration of strong acid vs strong base
2. Conductometric titration of weak acid vs. strong base
3. Determination of cell constant and conductance of solutions
4. Potentiometry - determination of redox potentials and emf
5. Estimation of Ferrous Iron by Dichrometry.
6. Determination of strength of an acid in Pb-Acid battery
7. Preparation of a polymer
8. Verify Lambert-Beer's law
9. Thin layer chromatography
10. Identification of simple organic compounds by IR
11. Separation of Organic mixtures by paper chromatography.
12. Preparation of Copper/Silver colloidal Nano materials

TEXT BOOKS:

1. Vogel's Text book of Quantitative Chemical Analysis, Sixth Edition – J. Mendham et al, Pearson Education.
2. Chemistry Practical – Lab Manual by Chandra Sekhar, GV Subba Reddy and Jayaveera

Problem Solving and Programming Laboratory

(Common to All Branches of Engineering)

B.Tech – I Semester **L-T-P-C**
0-0-3-1.5

Laboratory Experiments #

1. Assemble and disassemble parts of a Computer
2. Design a C program which reverses the number
3. Design a C program which finds the second maximum number among the given list of numbers.
4. Construct a program which finds the k^{th} smallest number among the given list of numbers.
5. Design an algorithm and implement using C language the following exchanges
   $a \leftarrow b \leftarrow c \leftarrow d$
6. Develop a C Program which counts the number of positive and negative numbers separately and also compute the sum of them.
7. Implement the C program which computes the sum of the first n terms of the series
   Sum = 1 – 3 + 5 -7 + 9
8. Design a C program which determines the numbers whose factorial values are between 5000 and 32565.
9. Design an algorithm and implement using a C program which finds the sum of the Infinite series $1 - x^2/2! + x^4/4! - x^6/6! + ...$
10 Design a C program to print the sequence of numbers in which each number is the sum of the three most recent predecessors. Assume first three numbers as 0, 1, and 1.
11. Implement a C program which converts a hexadecimal, octal and binary number to decimal number and vice versa.
12. Develop an algorithm which computes the all the factors between 1 to 100 for a given number and implement it using C.
13. Construct an algorithm which computes the sum of the factorials of numbers between m and n.
14. Design a C program which reverses the elements of the array.
15. Given a list of n numbers, Design an algorithm which prints the number of stars equivalent to the value of the number. The starts for each number should be printed horizontally.
16. Implement the sorting algorithms
    a. Insertion sort b. Exchange sort c. Selection sort d. Partitioning sort.
17. Illustrate the use of auto, static, register and external variables.
18. Design algorithm and implement the operations creation, insertion, deletion, traversing on a singly linked list.
19. Develop a C program which takes two numbers as command line arguments and finds all the common factors of those two numbers.
20. Design a C program which sorts the strings using array of pointers.

The above list is not exhaustive. Instructors may add some experiments to the above list. Moreover, 50% of the experiments are to be changed every academic year. Instructors can choose the experiments, provided those experiments are not repetitions.

Course outcomes: Student should be able to

1. Construct a Computer given its parts (L6)
2. Select the right control structure for solving the problem (L6)
3. Analyze different sorting algorithms (L4)
4. Design solutions for computational problems (L6)
5. Develop C programs which utilize the memory efficiently using programming constructs like pointers.

References:

1. B. Govindarajulu, "IBM PC and Clones Hardware Trouble shooting and Maintenance", Tata McGraw-Hill, 2nd edition, 2002.
2. R.G. Dromey, "How to Solve it by Computer". 2014, Pearson.

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COLLEGE OF ENGINEERING (AUTONOMOUS), PULIVENDULA - 516390, A.P, INDIA.
HUMANITIES AND SOCIAL SCIENCES DEPARTMENT

COMMUNICATIVE ENGLISH - 1 LAB

Subject Code	Title of the Subject	L	T	P	C
	Communicative English - 1 Lab	0	0	2	1

COURSE OBJECTIVES	
1	To expose the students to variety of self-instructional, learner friendly modes of language learning.
2	To help the students cultivate the habit of reading passages from the computer monitor. Thus providing them with the required facility to face computer based competitive exams like GRE, TOEFL, and GMAT etc.
3	To enable them to learn better pronunciation through stress, intonation and rhythm.
4	To train them to use language effectively to face interviews, group discussions, public speaking.
5	To initiate them into greater use of the computer in resume preparation, report writing, format making etc.

COURSE OUTCOMES	
CO1	To remember and understand the different aspects of the English language proficiency with emphasis on LSRW skills.
CO2	To apply communication skills through various language learning activities.
CO3	To analyze the English speech sounds, stress, rhythm, intonation and syllable division for better listening and speaking comprehension.
CO4	To evaluate and exhibit acceptable etiquette essential in social and professional settings.
CO5	To create awareness on mother tongue influence and neutralize it in order to improve fluency in spoken English.

Unit 1

1. Phonetics for listening comprehension of various accents
2. Reading comprehension
3. Describing objects/places/persons

Learning Outcomes

At the end of the module, the learners will be able to

- understand different accents spoken by native speakers of English
- employ suitable strategies for skimming and scanning on monitor to get the general idea of a text and locate specific information
- learn different professional registers and specific vocabulary to describe different persons, places and objects

Unit 2

1. JAM
2. Small talks on general topics
3. Debates

Learning Outcomes

At the end of the module, the learners will be able to

- produce a structured talk extemporarily
- comprehend and produce short talks on general topics
- participate in debates and speak clearly on a specific topic using suitable discourse markers

Unit 3

1. Situational dialogues – Greeting and Introduction
2. Summarizing and Note making
3. Vocabulary Building

Learning Outcomes

At the end of the module, the learners will be able to

- Learn different ways of greeting and introducing oneself/others
- summarize the content with clarity and precision and take notes while listening to a talk/lecture and make use of them to answer questions
- replenish vocabulary with one word substitutes, homonyms, homophones, homographs to reduce errors in speech and writing

Unit4

1. Asking for Information and Giving Directions
2. Information Transfer
3. Non-verbal Communication – Dumb Charade

Learning Outcomes
At the end of the module, the learners will be able to

- ➢ Learn different ways of asking information and giving directions
- ➢ Able to transfer information effectively
- ➢ understand non-verbal features of communication

Unit 5

1. Oral Presentations
2. Précis Writing and Paraphrasing
3. Reading Comprehension and spotting errors

Learning Outcomes
At the end of the module, the learners will be able to

- ➢ make formal oral presentations using effective strategies
- ➢ learn different techniques of précis writing and paraphrasing strategies
- ➢ comprehend while reading different texts and edit short texts by correcting common errors

Suggested Software

- Young India Films
- Walden Infotech
- Orell

Reference Books

- Bailey, Stephen. *Academic writing: A handbook for international students.* Routledge, 2014.
- Chase, Becky Tarver. *Pathways: Listening, Speaking and Critical Thinking.* Heinley ELT; 2nd Edition, 2018.
- Skillful Level 2 Reading & Writing Student's Book Pack (B1) Macmillan Educational.
- Hewings, Martin. *Cambridge Academic English (B2).* CUP, 2012.
- A Textbook of English Phonetics for Indian Students by T.Balasubramanyam

I B.Tech II Sem

COURSE NO. - NETWORK THEORY

L T P C
3 0 0 3

Course Objectives:

- To introduce basic laws, mesh & nodal analysis techniques for solving electrical circuits
- To impart knowledge on applying appropriate theorem for electrical circuit analysis
- To explain transient behavior of circuits in time and frequency domains
- To teach concepts of resonance
- To introduce open circuit, short circuit, transmission, hybrid parameters and their interrelationship.

UNIT 1: INTRODUCTION TO ELECTRICAL CIRCUITS

Passive components and their V-I relations, Energy sources - Ideal, Non-ideal, Independent and dependent sources, Source transformation Kirchoff's laws, Star–to-Delta or Delta-to-Star Transformations, Mesh analysis and Nodal analysis problem solving, Super node and Super mesh for DC Excitations.

Unit Outcomes

- Gain knowledge on basic network elements, voltage and current laws
- Apply Kirchhoff's laws, network reduction techniques on simple electrical circuits with dependent & independent sources
- Solve complex circuits using mesh and nodal analysis techniques

UNIT 2: NETWORK THEOREMS

Superposition theorem, Thevenin & Norton theorems, Maximum power transfer theorem, Reciprocity theorem, Millman theorem, Miller Theorem, Compensation theorem - problem solving using dependent sources also, Duality and dual networks.

Unit Outcomes:

- Understand significance of duality and dual networks
- Select appropriate theorem for network simplification
- Determine maximum power transfer to the load

UNIT 3: AC CIRCUITS AND TRANSIENTS

A.C Circuits: Characteristics of Sine wave, phase relation in pure Resistor, Inductor and Capacitor, Impedance, Admittance, Series and Parallel circuits, Power, problem solving using R-L-C elements with DC excitation and AC excitation.
Transients: Steady state and Transient response, DC Response of R-L, R-C and R-L-C, circuits, Sinusoidal Response of R-L, R-C and R-L-C circuit, Circuit elements in S-domain.

Unit Outcomes:

- Understand behavior of circuit elements under switching conditions
- Analyze response of RL, RC & RLC circuits in time & frequency domains
- Evaluate initial conditions in RL, RC & RLC circuits

UNIT 4: RESONANCE AND COUPLED CIRCUITS

Resonance: Series Resonance, Voltages and Currents in a Series Resonant Circuit, Quality factor and its effect on Bandwidth, Parallel resonance, Magnification.
Coupled Circuits: Introduction to Coupled circuits, Self Inductance Mutual inductance, dot convention, Coefficient of Coupling, Series and Parallel connection of Coupled Coils.

Unit Outcomes:

- Understand magnetically coupled circuits
- Determine resonant frequency and bandwidth of a simple series or parallel RLC circuit
- Determine voltages and currents in a resonant circuit

UNIT 5: TWO PORT NETWORKS & NETWORK FUNCTIONS

Two-Port Networks: Two port networks, Open circuit Impedance (Z) parameters, Short circuit Admittance (Y) parameters, Transmission (ABCD) parameters, Inverse Transmission (A'B'C'D') parameters, Hybrid (h) parameters, Inverse hybrid (g) parameters, Inter- relationships of different parameters, Inter-connection of two-port networks, T and π Representation.
Concept of complex frequency, driving point and transfer functions for one port and two port network, poles & zeros of network functions, Restriction on Pole and Zero locations of network function

Unit Outcomes:

- Determine network parameters for given two port network
- Relate different two port network parameters
- Represent transfer function for the given network

Text Books:

1. W. H. Hayt and J. E. Kemmerly, "Engineering Circuit Analysis", McGraw HillEducation, 2013.
2. M. E. Van Valkenburg, "Network Analysis", Prentice Hall, 2006.

References:

1. D. Roy Choudhury, "Networks and Systems", New Age International Publications,1998.

2. Network lines and Fields by John. D. Ryder 2nd edition, Asia publishing house.
3. Joseph Edminister and Mahmood Nahvi, "Electric Circuits", Schaum's Outline Series, Fourth Edition, Tata McGraw Hill Publishing Company, New Delhi, 2003.
4. Network Analysis by A. Sudhakar and Shyammohan S palli. McGraw-Hill, 5th Edition.

Course Outcomes:

- Solve network problems using mesh and nodal analysis techniques
- Analyze networks using Thevenin, Norton, Maximum power transfer, Superposition, Miller and Millman theorems
- Compute responses of first order and second order networks using time & frequency domain analysis
- Design resonant circuits for given bandwidth
- Utilize Z, Y, ABCD and h parameters for analyzing two port circuit behavior

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) :: PULIVENDULA
DEPARTMENT OF MATHEMATICS
I B.TECH – II SEMESTER (Common to all Branches of Engineering)
(THEORY)

Subject Code	Title of the Subject	L	T	P	C
	Differential Equations and Vector Calculus	3	1	-	4

COURSE OBJECTIVES	
1	To enlighten the learners in the concept of differential equations and multivariable calculus
2	To furnish the learners with basic concepts and techniques at plus two level to lead them into advanced level by handling various real world applications.

COURSE OUTCOMES	
CO1	solve the differential equations related to various engineering fields
CO2	Identify solution methods for partial differential equations that model physical processes
CO3	interpret the physical meaning of different operators such as gradient, curl and divergence
CO4	estimate the work done against a field, circulation and flux using vector calculus

Mapping between Course Outcomes and Programme Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1												
CO2												
CO3												
CO4												
CO5												

SYLLABUS

UNIT I: Linear Differential Equations of Higher Order

Definitions, complete solution, operator D, rules for finding complimentary function, inverse operator, rules for finding particular integral, method of variation of parameters.

UNIT II: Equations Reducible to Linear Differential Equations and Applications

Cauchy's and Legendre's linear equations, simultaneous linear equations with constant coefficients, Applications: Mass spring system and L-C-R Circuit problems.

UNIT III: Partial Differential Equations **08 hrs**

First order partial differential equations, solutions of first order linear and non-linear PDEs.

Solutions to homogenous and non-homogenous higher order linear partial differential equations.

UNIT IV: Multivariable Calculus (Vector differentiation)

Scalar and vector point functions, gradient, divergent, curl and their properties (Identities and applications)

UNIT V: Multivariable Calculus (Vector integration)

Line integral-circulation-work done, surface integral-flux, Green's theorem in the plane (without proof), Stoke's theorem (without proof), volume integral, Divergence theorem (without proof).

Textbooks:

1. Erwin Kreyszig, Advanced Engineering Mathematics, 10/e, John Wiley & Sons, 2011.
2. B. S. Grewal, Higher Engineering Mathematics, 44/e, Khanna publishers, 2017.

References:

1. R. K. Jain and S. R. K. Iyengar, Advanced Engineering Mathematics, 3/e, Alpha Science International Ltd., 2002.
2. Dennis G. Zill and Warren S. Wright, Advanced Engineering Mathematics, Jones and Bartlett, 2011.
3. Michael Greenberg, Advanced Engineering Mathematics, 2/e, Pearson, 2018
4. George B. Thomas, Maurice D. Weir and Joel Hass, Thomas Calculus, 13/e, Pearson Publishers, 2013.
5. Glyn James, Advanced Modern Engineering Mathematics, 4/e, Pearson publishers, 2011.

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JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS):: PULIVENDULA
DEPARTMENT OF PHYSICS
I B.TECH – II SEMESTER (common to EEE, ECE & CSE)
(THEORY)

Subject Code	Title of the Subject	L	T	P	C
	Applied Physics	3	0	-	3

COURSE OBJECTIVES	
1	To identify the importance of the optical phenomenon i.e. interference, diffraction and polarization related to its Engineering applications
2	To understand the mechanisms of emission of light, the use of lasers as light sources for low and high energy applications, study of propagation of light wave through optical fibres along with engineering applications.
3	To enlighten the concepts of Quantum Mechanics and to provide fundamentals of de'Broglie waves, quantum mechanical wave equation and its applications, the importance of free electron theory and semiconductors in the functioning of electronic devices.
4	To explain the significant concepts of dielectric and magnetic materials that leads to potential applications in the emerging micro devices
5	To give an impetus on the subtle mechanism of superconductors using the concept of BCS theory and their fascinating applications. Considering the significance of micro miniaturization of electronic devices and significance of low dimensional materials, the basic concepts of nanomaterials, their properties and applications in modern emerging technologies are to be elicited.

COURSE OUTCOMES	
CO1	**Explain** the need of coherent sources and the conditions for sustained interference (L2). **Identify** engineering applications of interference including homodyne and heterodyne detection (L3). **Analyze** the differences between interference and diffraction with applications (L4). **Illustrate** the concept of polarization of light and its applications (L2). **Classify** ordinary polarized light and extraordinary polarized light (L2)
CO2	**Explain** various types of emission of radiation (L2). **Identify** the role of laser in engineering applications (L3). **Describe** the construction and working principles of various types of lasers (L1). **Explain** the working principle of optical fibers (L2). **Classify** optical fibers based on refractive index profile and mode of propagation (L2). **Identify** the applications of optical fibers in medical, communication and other fields (L2). **Apply** the fiber optic concepts in various fields (L3).
CO3	**Describes** the dual nature of matter (L1). **Explains** the significance of wave function (L2). **Identify** the role of Schrodinger's time independent wave equation in studying particle in one-dimensional infinite potential well (L3). **Identify** the role of classical and quantum free electron theory in the study of electrical conductivity (L3). **Classify** the energy bands of semiconductors (L2). **Outline** the properties of n-type and p-type semiconductors and charge carriers (L2). **Interpret** the direct and indirect band gap semiconductors (L2). **Identify** the type of semiconductor using Hall effect (L2). **Identify** applications of semiconductors in electronic devices (L2)
CO4	**Explain** the concept of dielectric constant and polarization in dielectric materials (L2). **Summarize** various types of polarization of dielectrics (L2). **Interpret** Lorentz field and Claussius- Mosotti relation in dielectrics (L2). **Classify** the magnetic

	materials based on susceptibility and their temperature dependence (L2). **Explain** the applications of dielectric and magnetic materials (L2). **Apply** the concept of magnetism to magnetic devices (L3)
CO5	**Explain** how electrical resistivity of solids changes with temperature (L2). **Classify** superconductors based on Meissner's effect (L2). **Explain** Meissner's effect, BCS theory& Josephson effect in superconductors (L2). **Identify** the nano size dependent properties of nanomaterials (L2). **Illustrate** the methods for the synthesis and characterization of nanomaterials (L2). **Apply** the basic properties of nanomaterials in various Engineering branches (L3).

Mapping between Course Outcomes and Programme Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1												
CO2												
CO3												
CO4												
CO5												

SYLLABUS OF APPLIED PHYSICS

Unit-I: Physical Optics

Interference-Principle of superposition –Interference of light – Conditions for sustained interference- Interference in thin films (reflected light)- Newton's Rings: determination of wavelength - Engineering applications of Interference

Diffraction- Fraunhofer Diffraction-Single and Double slits - Diffraction Grating – Grating Spectrum - Engineering applications of diffraction.

Polarization-Polarization by double refraction-Nicol's Prism--Half wave and Quarter wave plates-Engineering applications of polarization.

Unit-II: Lasers and Fiber optics

Lasers: Introduction – Characteristics of laser – Spontaneous and Stimulated emission of radiation – Einstein's coefficients – Population inversion – Pumping mechanisms – Nd:YAG laser – He-Ne laser – Applications of lasers.

Fiber optics- Introduction to Optical Fibers-Total Internal Reflection -Acceptance Angle-Numerical Aperture-Classification of fibers based on refractive index profile –Propagation of electromagnetic wave through optical fibers – Modes -Importance of V-number –Block diagram of fiber optic communication system– Applications

Unit III: Quantum Mechanics, Free Electron Theory and Semiconductors

Quantum Mechanics: Dual nature of matter – de Broglie Hypothesis, Schrodinger's time independent wave equation – Significance of wave function – Particle in a one-dimensional infinite potential well.

Free Electron Theory: Classical free electron theory – Sources of electrical resistance – Equation for electrical conductivity – Quantum free electron theory– Fermi-Dirac distribution- Band theory of Solids.

Semiconductors: Origin of energy bands - Classification of solids based on energy bands – Intrinsic semiconductors – Intrinsic carrier concentration-Fermi energy – Electrical conductivity - extrinsic semiconductors P-type & N-type - Dependence of Fermi energy on carrier concentration and temperature- Direct and Indirect band gap semiconductors-Hall effect- Hall coefficient and its applications - Drift and Diffusion currents (Qualitative) - Continuity equation - Applications of Semiconductors.

Unit-IV: Dielectric and Magnetic Materials

Dielectric Materials -Dielectric polarization-Dielectric polarizability, Susceptibility and Dielectric constant- Types of polarizations: Electronic, Ionic and Orientation polarizations (Qualitative) - Lorentz (internal) field- Clausius-Mossotti equation-Applications of dielectrics: Ferroelectricity and Piezoelectricity.

Magnetic Materials - Introduction-Magnetic dipole moment-Magnetization-Magnetic susceptibility and permeability- Origin of permanent magnetic moment –Bohr Magneton, Classification of magnetic materials - Hysteresis - soft and hard magnetic materials-Applications

Unit – V: Superconductors and Nanomaterials

Superconductors: Properties of superconductors – Meissner effect– Type I and Type II superconductors – ac and dc Josephson effects – BCS theory (qualitative treatment) – Applications of superconductors.

Nanomaterials: Introduction – Surface to volume ratio and quantum confinement – Physical properties: optical, mechanical, electrical and magnetic- Synthesis of nanomaterials: Top-down: Ball Milling, Bottom-up: Chemical Vapour Deposition – Applications of nanomaterials.

Text books:

1. M. N. Avadhanulu, P.G.Kshirsagar& TVS Arun Murthy" A Text book of Engineering Physics"- S.Chand Publications, 11th Edition 2019.
2. B.K. Pandey and S. Chaturvedi, Engineering Physics, Cengage Learning, 2012.

Reference Books:

1. K Thyagarajan " Engineering Physics", Mc Graw Hill Publishing Company Ltd., 2016
2. Fundamentals of Physics – Halliday, Resnick and Walker, John Wiley &Sons
3. Shatendra Sharma, Jyotsna Sharma, " Engineering Physics", Pearson Education, 2018
4. T Pradeep "A Text book of Nano Science and Nano Technology"- Tata Mc Graw Hill, 2013
5. Engineering Physics - Sanjay D. Jain, D. Sahasrambudhe and Girish, University Press
6. Engineering Physics – D K Pandey, S. Chaturvedi, Cengage Learning
7. Semiconductor physics and devices- Basic principle – Donald A, Neamen, Mc Graw Hill
8. Introduction to Nanotechnology – C P Poole and F J Owens, Wiley

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11. Study of Energy gap of a material using p-n junction diode
12. Study of variation of Magnetic field along the axis of a current carrying coil – Stewart-Gee's Method
13. Determination of mobility of charge carriers in semiconductor by Hall effect.
14. Measurement of resistance of a semiconductor with varying temperature
15. Measurement of magnetic susceptibility by Kundt's tube method.

References:

1. S. Balasubramanian, M.N. Srinivasan "A Text book of Practical Physics"- S Chand Publishers, 2017.
2. R. Padma Suvarna, K. Thyagarajan "Engineering Physics Practicals" – NU Age Publishing House.

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Data Structures

(Common to All Branches of Engineering)

B. Tech – II Semester **L-T-P-C**

3-0-0-3

Course Objectives:

1. To teach the representation of solution to the problem using algorithm
2. To explain the approach to algorithm analysis
3. To introduce different data structures for solving the problems
4. To demonstrate modeling of the given problem as a graph
5. To elucidate the existing hashing techniques

Unit – 1: Introduction

Algorithm Specification, Performance analysis, Performance Measurement, Arrays: Arrays, Dynamically Allocated Arrays. Structures and Unions, Sorting: Motivation, Quick sort, how fast can we sort, Merge sort, Heap sort

Learning Outcomes:

Student should be able to

1. Analyze the given algorithm to find the time and space complexities (L4)
2. Select appropriate sorting algorithm (L4)
3. Design a sorting algorithm (L6)

Unit – 2: Stack, Queue and Linked lists

Stacks, Stacks using Dynamic Arrays, Queues, Circular Queues Using Dynamic Arrays, Evaluation of Expressions, Multiple Stacks and Queues. Linked lists: Singly Linked Lists and Chains, Representing Chains in C, Linked Stacks and Queues, Additional List Operations, Doubly Linked Lists.

Learning outcomes: Student should be able to

1. Evaluate expressions (L5)
2. Develop the applications using stacks and queues (L3)
3. Construct the linked lists for various applications (L6)

Unit – 3: Trees

Introduction, Binary Trees, Binary Tree Traversals, Additional Binary Tree Operations, Binary Search Trees, **Counting Binary Trees,** Optimal Binary search Trees, AVL Trees. B-Trees: BTrees, B + Trees.

Learning outcomes

1. Explain the concept of a tree (L2)
2. Compare different tree structures (L4)
3. Apply trees for indexing (L3)

Unit – 4: Graphs and Hashing

The Graph Abstract Data Type, Elementary Graph Operations, Minimum Cost Spanning Trees, Shortest Paths and Transitive Closure.

Hashing: Introduction to Hash Table, Static Hashing, Dynamic Hashing.

Learning outcomes:

Student should be able to

1. Recognize the importance of Graphs in solving real world problems (L2)
2. Apply various graph traversal methods to applications (L3)
3. Design a minimum cost solution for a problem using spanning trees (L6)
4. Select the appropriate hashing technique for a given application (L5)
5. Design a hashing technique (L6)

Unit – 5: Files and Advanced Sorting & Searching

File Organization: Sequential File Organization, Direct File Organization, Indexed Sequential File Organization.

Advanced sorting and searching: Sorting on Several keys, List and Table sorts, Summary of Internal sorting, External sorting.

Learning outcomes: Student should be able to

1. Organize data in the form of Files (L6)
2. Apply sorting on large amount of data (L3)

Text Books:

1. Ellis Horowitz, Sartaj Sahni and Susan Anderson Freed "Fundamentals of Data Structures in C", 2nd Edition, University Press, 2007.
2. Alan L. Tharp, "File Organization and Processing", Wiley and Sons, 1988.

Reference Books:

1. Mark Allen Weiss, "Data Structures and Algorithm Analysis in C", 2nd Edition, Pearson Education.
2. D. Samanta, "Classic Data Structures", 2nd Edition, Prentice-Hall of India, Pvt. Ltd., India, 2012.
3. Peter Bras, "Advanced Data Structures", Cambridge University Press, 2016
4. Richard F.Gilberg, Behrouz A.Forouzan, "Data Structures A Pseudo code Approach with C", Second Edition, Cengage Learning 2005.

Course Outcomes:

Students should be able to

1. Select Appropriate Data Structure for solving a real world problem (L4)
2. Select appropriate file organization technique depending on the processing to be done (L4)
3. Construct Indexes for Databases (L6)
4. Analyze the Algorithms (L4)
5. Develop Algorithm for sorting large files of data (L3)

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

I YEAR I SEMESTER

ENGINEERING WORKSHOP (19AME02)
(Common to CE, MECH & CSE)

L	T	P	C
0	0	3	1.5

Course Objectives:

- To bring awareness about workshop practices for Engineers.
- To familiarize how wood working operations can be performed.
- To teach the practices for sheet metal operations.
- To develop the technical skills related to fitting and electrical wiring.

Section 1 : Wood Working

Familiarity with different types of woods and tools used in wood working and make following joints

a) Half – Lap joint
b) Mortise and Tenon joint
c) Corner Dovetail joint or Bridle joint

Section 2 : Sheet Metal Working

Familiarity with different types of tools used in sheet metal working, Developments of following sheet metal job from GI sheets

a) Tapered tray b) Conical funnel c) Elbow pipe d) Brazing

Section 3 : Fitting

Familiarity with different types of tools used in fitting and do the following fitting exercises

a) V-fit b) Dovetail fit c) Semi-circular fit
d) Bicycle tire puncture and change of two wheeler tyre

Section 4 : Electrical Wiring

Familiarities with different types of basic electrical circuits and make the following connections

a) Parallel and series b) Two way switch c) Godown lighting d) Tube light
e) Three phase motor f) Soldering of wires

Text Books:

1. K.Venkata Reddy., Workshop Practice Manual, 6/e BS Publications.
2. Kannaiah P. and Narayana K.L., Workshop Manual, 2/e, Scitech publishers.
3. John K.C., Mechanical Workshop Practice. 2/e, PHI 2010.

Course Outcomes:

At the end of this Course the student will be able to

- Apply wood working skills in real world applications. (L6)
- Apply fitting operations in various applications. (L6)
- Build different parts with metal sheets in real world applications. (L5)
- Demonstrate soldering and brazing. (L4)
- Apply basic electrical engineering knowledge for house wiring practice. (L6)

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) :: PULIVENDULA

DEPARTMENT OF MECHANICAL ENGINEERING

(Common to all branches)

Subject Code	Title of the Subject	L	T	P	C
19A03102	Engineering Graphics	1	0	3	2.5

	COURSE OBJECTIVES
1	To bring awareness that Engineering Drawing is the Language of Engineers.
2	To familiarize how industry communicates technical information.
3	To teach the practices for accuracy and clarity in presenting the technical information.
4	To develop the engineering imagination essential for successful design.
5	To instruct the utility of drafting & modeling packages in orthographic and isometric drawings.
6	To train the usage of 2D and 3D modeling.
7	To instruct graphical representation of machine components.

COURSE OUTCOMES	
CO1	**Draw** various curves applied in engineering.
CO2	**Show** projections of Lines, planes and solids..
CO3	**Draw** the sections of solids and development of surfaces of solids.
CO4	**Use** computers as a drafting tool.
CO5	**Draw** isometric and orthographic drawings.

Mapping between Course Outcomes and Programme Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	1	3	1						1	1
CO2	3	3	1	3	1						1	1
CO3	3	3	1	3	1						1	1
CO4	3	3	1	3	1						1	1
CO5	3	2	1	3	1						1	1

UNIT – I:

Introduction to Engineering Graphics: Principles of Engineering Graphics and their significance – Conventions in drawing – Lettering – BIS conventions.

a) Conic sections including the rectangular hyperbola – general method only.
b) Cycloids, Epicycloids and Hypocycloids.
c) Involutes

(2L + 6P hrs)

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5. K. Jaya Chander Reddy

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UNIT – II:

Projection of Points, Lines and Planes: Projection of points in any quadrant, Lines inclined to one and both planes, Finding true lengths, Angle made by line. Projections of regular plane surfaces.

(2L + 6P hrs)

UNIT – III:

Projections of Solids: Projections of regular solids inclined to one and both planes by rotational and auxiliary views method.

Sections of Solids: Section planes and sectional view of right regular solids – Prism, Cylinder, Pyramid and Cone. True shapes of the sections. **(2L + 6P hrs)**

UNIT – V:

Development of Surfaces: Development of surfaces of right regular solids – Prism, Cylinder, Pyramid, Cone and their sectional parts. **(1L + 6P hrs)**

UNIT – V:

Orthographic Projections: Systems of projections, Conventions and Application to Orthographic Projections.

Isometric Projections: Principles of Isometric Projection – Isometric scale, Isometric views – Lines, Planes, Figures, Simple and Compound Solids. **(5L + 15P hrs)**

Text Books:

1. K.L.Narayana & P.Kannaiah, Engineering Drawing, 3/e, Scitech Publishers, Chennai, 2012.
2. N.D.Bhatt, Engineering Drawing, 53/e, Charotar Publishers, 2016.

Reference Books:

1. Dhanajay A Jolhe, Engineering Drawing, Tata McGraw-Hill, Copy Right, 2009.
2. Shah and Rana, Engineering Drawing, 2/e, Pearson Education, 2009.
3. Venugopal, Engineering Drawing and Graphics, 3/e, New Age Publishers, 2000.
4. K.C.John, Engineering Graphics, 2/e, PHI, 2013.
5. Basant Agarwal & C.M.Agarwal, Engineering Drawing, Tata McGraw-Hill, Copy Right, 2008.

I B.Tech II Sem

COURSE NO. - NETWORKS LAB

L	T	P	C
0	0	3	1.5

Course Objectives:

- To gain hands on experience in verifying Kirchoff's laws and network theorems
- To analyze transient behavior of circuits
- To study resonance characteristics
- To determine 2-port network parameters

List of Experiments:

Any 10 of the following experiments are to be conducted in Hardware/Simulation (Multisim/Open source software):

1. Verification of Kirchoff's Laws
2. Verification of Superposition & Reciprocity Theorem
3. Verification of Thevenin's and Norton's Theorem
4. Verification of Maximum Power Transfer Theorem
5. Verification of Millman and Miller Theorm
6. Measure and calculate RC time constant for a given RC circuit
7. Measure and calculate RL time constant for a given RL circuit
8. Measure and analyze (settling time, overshoot, undershoot, etc.) step response of for a given series RLC circuit for following cases:
   (i) $\zeta = 1$ (critically damped system)
   (ii) $\zeta > 1$(over damped system)
   (iii) $\zeta < 1$ (under damped system)
   Choose appropriate values of R, L, and C to obtain each of above cases one at a time.
9. Design a series RLC resonance circuit. Plot frequency response and find resonance frequency , Bandwidth , Q – factor.
10. Design a parallel RLC resonance circuit. Plot frequency response and find resonance frequency , Bandwidth , Q – factor.
11. Measure and calculate Z, Y parameters of two-port network.
12. Measure and calculate ABCD & h parameters of two-port network.

Course Outcomes:

- Verify Kirchoff's laws and network theorems
- Measure time constants of RL & RC circuits
- Analyze behavior of RLC circuit for different cases
- Design resonant circuit for given specifications
- Characterize and model the network in terms of all network parameters

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

Applied Physics Laboratory

(Common to I B.Tech II Semester ECE, EEE & CSE)

L	T	P	C
0	0	3	1.5

Course Objectives:

- Understands the concepts of interference, diffraction and their applications.
- Understand the role of optical fiber parameters in communication.
- Recognize the importance of energy gap in the study of conductivity and Hall Effect in a semiconductor.
- Illustrates the magnetic and dielectric materials applications.
- Apply the principles of semiconductors in various electronic devices.

EXP No.1: Determination of the thickness of thin object using wedge shape method

Learning Outcomes:
At the end of this experiment, the student will be able to

- **Operates** optical instrument like travelling microscope L2
- **Estimate** the thickness of the wire using wedge shape method L2
- **Identifies** the formation of interference fringes due to reflected light from non-uniform thin film. L2

EXP No. 2 : Determination of the radius of curvature of the lens by Newton's rings

Learning Outcomes:
At the end of this experiment, the student will be able to

- **Operates** optical instrument like travelling microscope. L2
- **Estimate** the radius of curvature of the lens L2
- **Identifies** the formation of interference fringes due to reflected light from non-uniform thin film. L2
- **Plots** the square of the diameter of a ring with no. of rings L3

EXP No. 3: Determination of wavelengths of various spectral lines of mercury source using diffraction grating in normal incidence method

Learning Outcomes:
At the end of this unit, the student will be able to

- **Operates** optical instrument like spectrometer. L2
- **Estimate** the wavelength of the given source L2
- **Identifies** the formation of grating spectrum due diffraction. L2

EXP No. 4: Determination of dispersive power of prism
Content of the Unit – IV
Learning Outcomes:
At the end of this unit, the student will be able to

- **Operates** optical instrument like spectrometer. L2
- **Estimate** the refractive index and dispersive power of the given prism L2
- **Identifies** the formation of spectrum due to dispersion. L2

EXP No. 4: Determination of dispersive power of prism.

Learning Outcomes:
At the end of this unit, the student will be able to

- **Operates** optical instrument like spectrometer. **L2**
- **Estimate** the refractive index and dispersive power of the given prism **L2**
- **Identifies** the formation of spectrum due to dispersion. **L2**

EXP No. 5: Determination of wavelength using diffraction grating by laser source.

Learning Outcomes:
At the end of this unit, the student will be able to

- **Operates** various instrument **L2**
- **Estimate** the wavelength of laser source **L2**
- **Identifies** the formation of grating spectrum due diffraction. **L2**

EXP No. 6: Determination of particle size by laser source

Learning Outcomes:
At the end of this unit, the student will be able to

- **Operates** various instrument **L2**
- **Estimate** the Particles size using laser **L2**
- **Identifies** the application of laser **L2**

EXP No. 7: Determination of numerical aperture and acceptance angle of an optical fiber

Learning Outcomes:
At the end of this unit, the student will be able to

- **Operates** various instruments and connect them as per the circuit. **L2**
- **Estimate** the numerical aperture and acceptance angle of a given optical fiber. **L2**
- **Identifies** the significance of numerical aperture and acceptance angle of an optical fiber in various engineering applications **L2**

EXP No. 8: Study of variation of Magnetic field along the axis of a current carrying coil – Stewart-Gee's Method.

Learning Outcomes:
At the end of this unit, the student will be able to

- **Operates** various instruments and connect them as per the circuit. **L2**
- **Estimate** the magnetic field along the axis of a circular coil carrying current. **L2**
- **Plots** the intensity of the magnetic field of circular coil carrying current with distance **L3**

EXP No. 9: Study of B-H curve of Ferromagnetic material.

Learning Outcomes:
At the end of this unit, the student will be able to

- **Operates** various instruments and connect them as per the circuit. **L2**
- **Estimate** the hysteresis loss, coercivity and retentivity of the ferromagnetic material **L2**
- **Classifies** the soft and hard magnetic material based on B-H curve. **L2**
- **Plots** the magnetic field H and flux density B **L3**

EXP No. 10: Study of Energy gap of a material using p-n junction diode

Learning Outcomes:
At the end of this unit, the student will be able to

- **Operates** various instruments and connect them as per the circuit. **L2**
- **Estimate** the hysteresis loss, coercivity and retentivity of the ferromagnetic material. (L2) **L2**
- **Classifies** the soft and hard magnetic material based on B-H curve. **L2**
- **Estimate** the energy gap of a semiconductor. **L2**
- **Illustrates** the engineering applications of energy gap. **L3**
- **Plots 1/T** with log R **L3**

Reference Books:

1. S. Balasubramanian, M.N. Srinivasan "A Text book of Practical Physics"- S Chand Publishers, 2017
2. http://vlab.amrita.edu/index.php -Virtual Labs, Amrita University

Course Outcomes:
At the end of this Course the student will be able to

- **Operate** optical instruments like microscope and spectrometer **L2**
- **Determine** thickness of a hair/paper with the concept of interference **L2**
- **Estimate** the wavelength of different colors using diffraction grating and resolving power **L2**
- **Plot** the intensity of the magnetic field of circular coil carrying current with distance **L3**
- **Evaluate** the acceptance angle of an optical fiber and numerical aperture **L3**
- **Determine** the resistivity of the given semiconductor using four probe method **L3**
- **Identify** the type of semiconductor i.e., n-type or p-type using hall effect **L3**
- **Calculate** the band gap of a given semiconductor **L3**

Data Structures Lab

(Common to All Branches of Engineering)

B. Tech – II Semester **L-T-P-C**

0-0-3-1.5

Course Objectives:

1. To introduce to the different data structures
2. To elucidate how the data structure selection influences the algorithm complexity
3. To explain the different operations that can be performed on different data structures
4. To introduce to the different search and sorting algorithms.

Laboratory Experiments:

1. String operations using array of pointers
2. Searching Algorithms (With the Number of Key Comparisons) Sequential, Binary and Fibonacci Search Algorithms.
3. Sorting Algorithms: Insertion Sort, Selection Sort, Shell Sort, Bubble Sort, Quick Sort, Heap Sort, Merge Sort, and Radix Sort. Using the system clock, compute the time taken for sorting of elements. The time for other operations like I/O etc should not be considered while computing time.
4. Implementation of Singly Linked List, Doubly Linked List, Circular Linked List
5. Stack implementation using arrays
6. Stack implementation using linked lists
7. Queue implementation using arrays. Implement different forms of queue.
   While implementing you should be able to store elements equal to the size of the queue. No positions should be left blank.
8. Queue implementation using linked lists
9. Creation of binary search tree, performing operations insertion, deletion, and traversal.
10. Breadth first search
11. Depth first search
12. Travelling sales man problem
13. File operations
14. Indexing of a file
15. Reversing the links (not just displaying) of a linked list.
16. Consider a linked list consisting of name of a person and gender as a node. Arrange the linked list using 'Ladies first' principle. You may create new linked lists if necessary.
17. An expression can be represented in three ways: infix, prefix and postfix. All the forms are necessary in different contexts. Write modules to convert from one form to another form.
18. A table can be defined as a collection of rows and columns. Each row and column may have a label. Different values are stored in the cells of the table.

The values can be of different data types. Numerical operations like summation, average etc can be performed on rows/columns which contain numerical data. Such operations are to be prevented on data which is not numeric. User may like to insert row/columns in the already existing table.
User may like to remove row/column. Create table data type and support different operations on it.

Course Outcomes:

At the end of the course students should be able to

1. Select the data structure appropriate for solving the problem (L5)
2. Implement searching and sorting algorithms (L3)
3. Design new data types (L6)
4. Illustrate the working of stack and queue (L4)
5. Organize the data in the form of files (L6)

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR
COLLEGE OF ENGINEERING (AUTONOMOUS), PULIVENDULA

B.Tech – II-I Sem (R19)

L	T	P	C
3	0	0	3

COMPLEX VARIABLES AND TRANSFORMS

(Common to ECE & EEE)

Course Objective:

This course aims at providing the student to acquire the knowledge on the calculus of function of complex variables. The student develops the idea of using continuous/discrete transforms.

Unit-I: Complex Variables – Differentiation:

Introduction to functions of complex variable-concept of Limit & continuity- Differentiation, Cauchy-Riemann equations in Cartesian and Polar coordinates (without proof), analytic functions, harmonic functions, finding harmonic conjugate-construction of analytic function by Milne Thomson method.

Properties of elementary functions of exponential, trigonometric, hyperbolic, and logarithm. Conformal mappings-standard and special transformations (z^2, sin z, cos z, e^z, lnz) Mobius transformations (bilinear) and their properties.

Unit Outcomes:

Students will be able to

- Understand functions of Complex variable and its properties.
- Find derivatives of complex functions.
- Understand the analyticity of complex functions.
- Understand the conformal mappings of complex functions.

Unit-II: Complex Variables – Integration:

Line integral-Contour integration, Cauchy's integral theorem (with proof), Cauchy Integral formula, generalized Cauchy Integral formula (All theorems without Proof).

Power series expansions: Taylor's series and Laurent's series (without proof); zeros of analytic functions, singularities.

Residues: Evaluation of residue by formula and by Laurent's series, Cauchy Residue theorem (without proof), Evaluation of definite integral involving sine and cosine, Evaluation of certain improper integrals (around unit circle, semi-circle with f(z) not having poles on real axis).

BoS Maths

Unit Outcomes:

Students will be able to

- Understand the integration of complex functions.
- Apply Cauchy's integral theorem and Cauchy's integral formula.
- Understand singularities of complex functions.
- Evaluate improper integrals of complex functions using Residue theorem.

Unit-III: Laplace Transforms

Definition-Laplace transform of standard functions-existence of Laplace Transform – Inverse transform – First shifting Theorem, Transforms of derivatives and integrals – Unit step function – Second shifting theorem – Dirac's delta function – Convolution theorem – Laplace transform of Periodic function. Differentiation and integration of transform – solving Initial value problems to ordinary differential equations with constant coefficients using Laplace transforms.

Unit Outcomes:

Students will be able to

- Understand the concept of Laplace transforms and finds the Laplace transforms of elementary functions.
- Find the Laplace transforms of general functions using its properties.
- Understand Laplace transforms of special functions (Unit step function, Unit Impulse & Periodic).
- Apply Laplace transforms to solve Differential Equations.

Unit-IV: Fourier series &Fourier transforms

Fourier Series : Fourier coefficients (Euler's formulae) – Dirichlet conditions for the existence of Fourierseries – functions having discontinuity-Fourier series of Even and odd functions – Fourier seriesin an arbitrary interval – Half-range Fourier sine and cosine expansions.

Fourier Integrals & Fourier Transforms: Fourier integral theorem (without proof) – Fourier sine and cosine integrals-complex form ofFourier integral. Fourier transform – Fourier sine and cosine transforms – Properties – Inverse transforms – convolution theorem – Finite Fourier Sine and Cosine transforms.

Unit Outcomes:

Students will be able to

- Understand finding Fourier series expression of the given function.
- Determine Fourier coefficients (Euler's) and identify existence of Fourier series of the given function.
- Expand the given function in Fourier series given in Half range interval.
- Find Fourier Sine and cosine integrals.

- Understand Fourier transforms.
- Apply properties of Fourier transforms.

Unit-V: Z Transforms:

Z-transform – Inverse z-transform – Properties – Damping rule – Shifting rule – Initial and final value theorems. Convolution theorem – Solution of difference equations by z-transforms.

Unit Outcomes:

Students will be able to

- Understand Z transforms.
- Apply properties of Z transforms.
- Apply Z transforms to solve difference equations.

Course Outcomes:

After the completion of course, students will be able to

- Understand the analyticity of complex functions and conformal mappings.
- Apply Cauchy's integral formula and Cauchy's integral theorem to evaluate improper integrals along contours.
- Understand the usage of Laplace Transforms, Fourier Transforms and Z transforms.
- Evaluate the Fourier series expansion of periodic functions.

Text Books:

1. B.S.Grewal, "Higher Engineering Mathematics", Khanna publishers.
2. Erwin Kreyszig, "Advanced Engineering Mathematics", Wiley India

Reference Books:

1. B.V.Ramana, Higher, "Engineering Mathematics", McGraw Hill publishers.
2. Alan Jeffrey, "Advanced Engineering Mathematics", Elsevier.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

COLLEGE OF ENGINEERING (Autonomous) PULIVENDULA

II B.Tech I Sem (E.C.E) **L – T – P – C** **3 - 0 – 0 - 3**

ELECTRONIC DEVICES AND CIRCUITS

COURSE OBJECTIVES:

1. To provide a comprehensive idea about semiconductors, working of PN junction diode.
2. To acquire knowledge about special diodes and applications of PN junction diode like rectifiers, clippers and clampers.
3. To explain the construction and working of Bipolar junction transistors and Field effect transistors.
4. To introduce various biasing and stabilizationcircuits.
5. To analyze BJT modeling using h-parameters and to find h-parameters of BJT in different configurations.

UNIT I

Semiconductors: Intrinsic and extrinsic semiconductors, mobility and conductivity, Fermi level and carrier concentration of semiconductors, Drift and diffusion currents, continuity equation, Hall Effect.

PN junction diode: Band structure of PN Junction, Quantitative Theory of PN Diode, VI Characteristics, Temperature Dependence, Diode resistance, Transition and Diffusion Capacitance of PN Junction, Illustrative problems.

Learning Outcomes:

At the end of the unit, the student will be able to

- Understand the semiconductor materials properties and their importance in semiconductor devices.
- Appreciate the working of PN Junction diode and its parameters.

UNIT II

Special Diodes: Zener and Avalanche Breakdowns, VI Characteristics of Zener diode, Zener diode as voltage regulator, Construction, operation and VI characteristics of Tunnel Diode, LED, Solar cell, Schottky Barrier Diode, Varactor Diode, Photo Diode, SCR and UJT.

Diode applications: Half-wave, Full-wave and Bridge Rectifiers with and without Filters, Ripple Factor and Regulation Characteristics, Clipping and Clamping circuits, Voltage doubler , Illustrative problems.

Learning Outcomes:

At the end of the unit, the student will be able to

- Know the usage of special diodes in different applications.
- Use the PN junction diode for different applications.
- Compare the working of rectifier circuits with and without filters.

UNIT III

Bipolar Junction Transistors: Transistor construction, BJT Operation, Transistor as an Amplifier, Common Emitter, Common Base and Common Collector Configurations, Limits of Operation, BJT Specifications.

Field Effect Transistors: The Junction Field Effect Transistor (Construction, Principle of Operation), Pinch off Voltage, VI Characteristics, CG,CS and CD configurations,FET as Voltage Variable Resistor, Comparison between BJT and FET, MOSFET Construction, VI Characteristicsand working in depletion and enhancement mode

Learning Outcomes:

At the end of the unit, the student will be able to

- Know the construction, operation, characteristics and applications of BJT &FET's.
- Compare the working of BJT & FET's in different configurations.

UNIT IV

BIASING AND STABILISATION: Operating Point, DC and AC Load Lines, Importance of Biasing, Fixed Bias, Collector to Base Bias, Self Bias, Bias Stability, Stabilization against Variations in I_{CO} V_{BE} and β, Bias Compensation Using Diodes and Transistors, Thermal Runaway, Condition for Thermal Stability in CE configuration, Illustrative problems.

Learning Outcomes:

At the end of the unit, the student will be able to

- Know the importance of DC, AC Load lines & Biasing.
- Apply biasing and compensation circuits for providing stability against variations in I_{CO}, V_{BE}andβ.

UNIT V

SMALL SIGNAL ANALYSIS OF AMPLIFIERS: BJT Modeling using h-parameters, Determination of h-Parameters from Transistor Characteristics, Measurement of h-Parameters, Analysis of CE, CB and CC configurations using h-Parameters, Comparison of CB, CE and CC configurations, Simplified Hybrid Model, Illustrative problems.

Learning Outcomes:

At the end of the unit, the student will be able to

- Determine and measure h-parameters of a BJT.
- Analyze CE, CB & CC Configurations using h-parameters.

TEXT BOOKS:

1. Electronics Devices and Circuits, J.Millman and Christos. C. Halkias, 3rd edition, Tata McGraw Hill, 2006.
2. Electronics Devices and Circuits Theory, David A. Bell, 5th Edition, Oxford Universitypress. 2008.

REFERENCE BOOKS:

1. Electronics Devices and Circuits Theory, R.L.Boylestad, LousisNashelsky and K.Lal Kishore, 12th edition, 2006, Pearson, 2006.
2. Electronic Devices and Circuits, N.Salivahanan, and N.Suresh Kumar, 3rd Edition, TMH, 2012
3. Microelectronic Circuits, S.Sedra and K.C.Smith, 5th Edition, Oxford University Press.

COURSE OUTCOMES:

After the completion of the course, students will be able to

1. Get a comprehensive idea about semiconductors, working of PN junction diode.
2. Acquire knowledge about special diodes and applications of PN junction diode like rectifiers, clippers and clampers.
3. Understand the construction and working of Bipolar junction transistors and Field effect transistors.
4. Explain the working of variousbiasing and stabilization circuits.
5. Analyze and find h-parameters of BJT in different configurations.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

COLLEGE OF ENGINEERING (Autonomous) PULIVENDULA

II B.Tech I Sem (E.C.E) L – T – P – C 3 - 0 – 0 - 3

SWITCHING THEORY AND LOGIC DESIGN

COURSE OBJECTIVES:

1. To acquire knowledge about various number systems, binary codes, error detection and correction codes, Boolean algebra and logic gates.
2. To learn simplification of Boolean functions and their realization using logic gates.
3. To understand and design various combinational logic circuits.
4. To study the design of sequential logic circuits in synchronous and asynchronous modes.
5. To introduce programmable logic devices and to realize switching functions using them.

UNIT I: NUMBER SYSTEM & BOOLEAN ALGEBRA

Digital Systems, Binary Numbers, Number base conversions, Complements of numbers, Signed binary numbers, Error detection and correction codes, Binary codes. Boolean Algebra-Basic definition, Basic theorems and properties, Boolean Functions, Canonical & Standard forms, other logic operations & Logic gates.

Learning Outcomes:

At the end of the unit, the student will be able to

- Understand and apply different number systems.
- Explain importance of different coding schemes and functionality of logic gates.

UNIT II: GATE LEVEL MINIMIZATION

The map method, four variable K-map, Five variable map, POS & SOP Simplification, Don't care conditions, NAND & NOR Implementation, Other two level Implementation, Ex-OR Function, Tabular Method- Simplification of Boolean function using Q-M tabulation Method.

Learning Outcomes:

At the end of the unit, the student will be able to

- Apply basic laws to simplify Boolean expressions.
- Compare K- Map and Q-M methods of minimizing logic functions.

UNIT III: ANALYSIS AND SYNTHESIS OF COMBINATIONAL CIRCUITS:

Combinational circuits, Analysis & Design procedure, Binary Adder, Subtractor, Decimal Adder, Binary Multiplier, Magnitude comparator, Decoders, Encoders, Multiplexers, De-multiplexers.

Learning Outcomes:

At the end of the unit, the student will be able to

- Apply Boolean algebra for describing combinational digital circuits.
- Design and analyse various Combinational logic circuits.

UNIT IV: ANALYSIS AND SYNTHESIS OF SEQUENTIAL CIRCUITS:

Sequential Circuits – Latches and FlipFlops, Analysis of Clocked sequential circuits, State Reduction & Assignment, Design procedure, Registers, Shift Registers, Counters – Ripple Counters, Synchronous counters and other counters.

Learning Outcomes:

At the end of the unit, the student will be able to

- Describe behaviour of Flip-Flops and Latches.
- Design sequential circuits using flip flops , registers and counters

UNITV: ASYNCHRONOUS SEQUENTIAL LOGIC & PROGRAMMABLE MEMORIES

Introduction, Analysis Procedure, Circuits with Latches, Design Procedure, Reduction of State flow tables, Race-free State Assignment, Hazards. Random Access Memory, Memory Decoding, Error detection and correction, ROM, PLA, PAL, PLD.

Learning Outcomes:

At the end of the unit, the student will be able to

- Describe functional differences between different types of memories.
- Compare different types of Programmable Logic Devices.

TEXT BOOKS:

1. Digital Design, M.Morris Mano & Michel D. Ciletti, 5th Edition, Pearson Education, 1999.
2. Switching theory and Finite Automata Theory, ZviKohavi and NirahK.Jha, 2nd Edition, Tata McGraw Hill, 2005.

REFERENCE BOOKS:

1. Fundamentals of Logic Design, Charles H Roth,Jr., 5th Edition, Brooks/coleCengage Learning, 2004.
2. Digital & State Machine Design, Comer, 3rd Edition, OXFORD.
3. Fundamentals Digital Circuits, A.Anand Kumar, 3rd Edition, PHI, 2014.

COURSE OUTCOMES:

After the completion of the course, students will be able to

1. Understand various number systems, binary codes, error detection and correction codes, Boolean algebra and functioning of logic gates.

2. Simplify Boolean functions and realize them using logic gates.
3. Design various combinational logic circuits.
4. Analyse the sequential logic circuits in synchronous and asynchronous modes.
5. Appreciate realization of switching functions using programmable logic devices.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

COLLEGE OF ENGINEERING (Autonomous) PULIVENDULA

II B.Tech I Sem (E.C.E) **L – T – P – C 3 - 0 – 0 - 3**

SIGNALS AND SYSTEMS

COURSE OBJECTIVES:

1. To understand the basic properties ofsignal&systems and LTI systems.
2. Tolearn Fourierseriesrepresentationof periodic signals.
3. To study representation of signals in continuous and discretetimeFouriertransform
4. To analyze thesampling theorem and characterizesignals & systems in time & frequency domain.
5. To apply Laplacetransform andZtransform to study about thestabilityofsystems.

UNIT I

Signals and Systems: Continuous and Discrete Time Signals, Transformations of the Independent Variable, Elementary Signals-Unit Impulse, Unit Step Functions, Ramp Signal, Rectangular function, Signum Function, Sinc& Sa Function, Exponential and Sinusoidal Signals, Classification of Signals & Systems, Continuous and Discrete Time Systems, Basic System Properties, Linear Time Invariant (LTI) Systems, Discrete-Time LTI Systems, Convolution Sum, Continuous Time LTI Systems, Convolution Integral, Properties of LTI Systems, Causal LTI Systems described by Differential and Difference Equations, Singularity Functions.

Learning Outcomes:

At the end of the unit, the student will be able to

- Understand different types of signals and systems.
- State the properties of LTI systems.

UNIT II

Fourier series representation of periodic signals: Response of LTI Systems to Complex Exponentials. Fourier Series Representation of Continuous Time Periodic Signals, Trigonometric, Polar, Exponential fourier Series & related problems, Convergence of the Fourier Series, Properties of Continuous Time Fourier Series, Fourier Series Representation of Discrete Time Periodic Signals, Properties of Discrete Time Fourier Series, Fourier Series and LTI Systems,

Learning Outcomes:

At the end of the unit, the student will be able to

- Describe continuous time signals and discrete time signal.
- Analyze the periodic signals by applying Fourier series.

UNIT III

The Continuous-Time Fourier Transform: Representation of aperiodic Signals, Continuous Time Fourier Transform, Fourier Transform for Periodic Signals, Properties of the Continuous Time Fourier Transform, Systems characterized by Linear constant coefficient differential equations, Discrete Time Fourier Transform - Representation of Aperiodic Signals, Discrete Time Fourier Transform, Frequency Response, Systems Characterized by Linear Constant-Coefficient Difference Equations.

Learning Outcomes:

At the end of the unit, the student will be able to

- Analyze the differences between Fourier series and Fourier transforms.
- Represent the signals in continuous and discretetimeFouriertransform.

UNIT IV

Time & Frequency Characterization of Signals and Systems: The Magnitude Phase Representation of the Fourier Transform, Magnitude Phase Representation of the Frequency Response of LTI Systems, Time-Domain Properties of Ideal Frequency Selective Filters, Time Domain and Frequency Domain Aspects of Non-ideal Filters, Examples of Continuous time filters and Discrete time filters described by differential equations, First-Order and Second-Order Continuous and Discrete-Time Systems, Examples of Time and Frequency Domain Analysis of Systems,

Sampling: Representation of a Continuous Time Signal by Its Samples, Sampling Theorem, Reconstruction of a Signal from Its Samples Using Interpolation, Effect of under sampling: Aliasing, Discrete Time Processing of Continuous-Time Signals.

Learning Outcomes:

At the end of the unit, the student will be able to

- Understand the impulse response, transfer characteristics of LTI system and various filters.
- Analyse filter characteristics and physical realisation of LTI system.

UNIT V

Laplace and z-Transforms: The Laplace Transform, Region of Convergence for Laplace Transforms, Inverse Laplace Transform, Geometric Evaluation of the Fourier Transform from the Pole-Zero Plot, Properties of the Laplace Transform, Some Laplace Transform Pairs, Analysis and Characterization of LTI Systems Using the Laplace Transform, System Function Algebra and Block Diagram Representations, Unilateral Laplace Transform, Z-Transform - Region of Convergence for the z-Transform, Inverse z-Transform, Geometric Evaluation of the Fourier Transform from the Pole-Zero Plot, Properties of the z-Transform, Some Common z-Transform Pairs, Analysis and Characterization of LTI Systems Using z-Transforms, System Function Algebra and Block Diagram Representations, Unilateral z-Transforms.

Learning Outcomes:

At the end of the unit, the student will be able to

- Analyze the continuous time signals, discrete time signals and systems using Laplace and Z transforms.
- Apply transform techniques to analyse discrete-time signals and systems.

TEXT BOOKS:

1. Signals and Systems, Alan V. Oppenheim, Alan S. Willsky, & S. Hamid, 2nd Edition, Pearson Higher Education, 1997.
2. Principles of Linear Systems and Signals, B.P. Lathi, 2nd Edition, Oxford University Press, 2011.

REFERENCE BOOKS:

1. Signals & Systems, Simon Haykin and B. Van Veen, 2nd Edition, John Wiley, 2003.
2. Signals and systems, NarayanaIyer and K Satya Prasad, 1st Edition, CENGAGE Learning, 2011.
3. Signals, Systems and Transforms, C. L. Philips, J. M. Parr and Eve A. Riskin, 4th Edition, Pearson education, 2008.

COUSE OUTCOMES:

After the completion of the course, students will be able to

1. Explain the basic properties ofsignal& systems and LTI systems.
2. Apply Fourierseries to represent periodic signals.
3. Represent signals in continuous and discretetimeFouriertransform
4. Analyze thesamplingtheoremand characterizesignals & systems in time & frequency domain.
5. Study thestabilityofsystems by applying Laplace transform andZtransform.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

COLLEGE OF ENGINEERING (Autonomous) PULIVENDULA

II B.Tech I Sem (E.C.E) **L – T – P – C 3 - 0 – 0 - 3**

CONTROL SYSTEMS

COURSE OBJECTIVES:

1. Merits and demerits of open loop and closed loop systems; the effect of feedback.
2. The use of block diagram algebra and Mason's gain formula to find the overalltransfer function.
3. Transient and steady state response, time domain specifications and the concept of Root loci.
4. Frequency domain specifications, Bode diagrams and Nyquist plots.
5. State space modelling of Control system

UNIT–I

Control SystemsConcepts: Open loop and closed loop control systems and their differences- Examples of control systems- Classification of control systems, Feedback characteristics, Effects of positive and negative feedback, Mathematical models – Differential equations of translational and rotational mechanical systems and electrical systems, Analogous Systems, Block diagram reduction methods – Signal flow graphs - Reduction using Mason's gain formula. Principle of operation of DC and AC Servo motor, Transferfunction of DC servo motor - AC servo motor,Synchros.

Learning Outcomes:

At the end of the unit, the student will be able to

- Write the differential equations for mechanical and electricalsystems.
- Obtain the transfer function from block diagrams, servo motors and signal flowgraphs.

UNIT-II

Time ResponseAnalysis: Step Response - Impulse Response - Time response of first order systems – Characteristic Equation of Feedback control systems, Transient response of second order systems - Time domain specifications – Steady state response - Steady state errors and error constants, Study of effects and Design of P, PI, PD and PID Controllers on second order system.

Learning Outcomes:

At the end of the unit, the student will be able to

- Analyze the time domainspecifications.
- Calculate the steady stateerrors.
- Understand about Proportional, Integral and Derivative controllers along withcombinations.

UNITIII

Stability Analysis in TimeDomain: The concept of stability – Routh's stability criterion – Stability and conditional stability - limitations of Routh's stability. The Root locus concept-construction of root loci-effects of adding poles and zeros to G(s)H(s) on the rootloci.

Learning Outcomes:

At the end of the unit, the student will be able to

- Analyze the concept of stability in timedomain
- Apply the concept of Routh's stability and Root locus in timedomain

UNIT–IV

Frequency ResponseAnalysis: Introduction, Frequency domain specifications-Bode diagrams-Determination of Frequency domain specifications and transfer function from the Bode Diagram-Stability Analysis from Bode Plots. Polar Plots-Nyquist Plots- Phase margin and Gain margin-StabilityAnalysis.

Compensation techniques – Study of Effects and Design of Lag, Lead, Lag-Lead Compensator design in frequency Domain on a second order system.

Learning Outcomes:

At the end of the unit, the student will be able to

- Evaluate the frequency domain specifications from Bode, Polar and Nyquistplots
- Design Compensators for varioussystems
- Deducing transfer functions from Bode Plots
- Understand difference between Phase and Gainmargins

UNIT–V

State Space Analysis of ContinuousSystems: Concepts of state, state variables and state model - differential equations & Transfer function models - Block diagrams. Diagonalization, Transfer function from state model, solving the Time invariant state Equations- State Transition Matrix and it's Properties. System response through State Space models.The concepts of controllability and observability, Duality between controllability andobservability.

Learning Outcomes:

At the end of the unit, the student will be able to

- Understand the concept of state space, controllability andobservability
- Obtain the transfer function from sate space and viceversa
- Understand the state transition method of solving time invariant stateequations

TEXTBOOKS:

1. Modern Control Engineering by Katsuhiko Ogata, Prentice Hall of India Pvt. Ltd., 5th edition, 2010.

2. Control Systems Engineering by I. J. Nagrath and M. Gopal, New Age International (P) Limited Publishers, 5th edition,2007.

REFERENCE BOOKS:

1. Control Systems Principles & Design by M.Gopal, 4th Edition, McGraw Hill Education,2012.
2. Automatic Control Systems by B. C. Kuo and FaridGolnaraghi, John wiley and sons, 8th edition,2003.
3. Feedback and Control Systems, Joseph J Distefano III, Allen R Stubberud& Ivan J Williams, 2nd Edition, Schaum's outlines, McGraw Hill Education,2013.
4. Control System Design by Graham C. Goodwin, Stefan F. Graebe and Mario E. Salgado, Pearson, 2000.
5. Feedback Control of Dynamic Systems by Gene F. Franklin, J.D. Powell and Abbas Emami- Naeini, 6th Edition, Pearson,2010.

COURSE OUTCOMES:

After completing the course, the student should be able to:

1. Understandtheconceptsofcontrolsystemsclassification,feedbackeffect,mathematical modelling, time response and frequency responsecharacteristics, state space analysis
2. Apply the concepts of Block diagram reduction, Signal flow graph method and state space formulation for obtaining mathematical and Root locus, Bode, Nyquist, Polar plots for stability calculations, controllability and observability and demonstrate the use of thesetechniques.
3. Analyse time response analysis, error constants, and stability characteristics of a given mathematical model using different methods.
4. Design and develop different compensators, controllers and their performance evaluation for various conditions. Implement them in solving various engineering applications.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

COLLEGE OF ENGINEERING (Autonomous) PULIVENDULA

II B.Tech I Sem (E.C.E) **L – T – P – C 3 - 0 – 0 - 3**

ELECTRICALTECHNOLOGY

COURSE OBJECTIVES:

1. The constructional features of DC machines, different types of DC machines and theircharacteristic.
2. The constructional details of single phase transformer and their performancecharacteristics by conducting suitabletests.
3. The analysis of three phase balanced and unbalanced circuits, three phase induction motors and theircharacteristics.
4. The constructional feature and operation of synchronousmachines.

UNIT I

DCGenerators: Generators – Principle of Operation – Constructional Features – E. M.F Equation– Numerical Problems – Methods of Excitation – Separately Excited and Self Excited Generators – Build-Up of E.M.F - Critical Field Resistance and Critical Speed - Load Characteristics of Shunt, Series and Compound Generators-Applications

Learning Outcomes:

- To know about principle of operation of a DC machine working as agenerator
- To distinguish between self and separately excited generators andclassification
- To know how Emf isdeveloped
- To distinguish between critical field resistance and criticalspeed
- To know about various characteristics of different types ofgenerators

UNIT–II

D.C.Motors: Motors – Principle of Operation – Back E.M.F. –Torque Equation – Characteristics and Application of Shunt, Series and Compound Motors-Speed Control of D.C. Motors: Armature Voltage and Field Flux Control Methods. Three Point Starter-Losses – Constant & Variable Losses – Calculation of Efficiency - Swinburne'sTest.

Learning Outcomes:

- To know about principle of operation of DC machine working as amotor
- To know about torquedeveloped
- To know about how to control speed of DC shuntmotor
- To know about necessity ofstarter
- To know about various load characteristics of various types of DCmotors

UNIT-III

Single Phase Transformers & Three Phase A.C. Circuits: Introduction - Single Phase Transformers- Constructional Details and Applications - Emf Equation - Operation on No Load and on Load - Phasor Diagrams-Equivalent Circuit - Losses and Efficiency-Regulation- OC and SC Tests - Predetermination of Efficiency and Regulation. Analysis of Balanced Three Phase Circuits – Phase Sequence- Star and Delta Connection - Relation between Line and Phase Voltages and Currents in Balanced Systems - Measurement of Active and Reactive Power in Balanced and Unbalanced Three PhaseSystems.

Learning Outcomes:

- To understand the principle of operation of 1-ϕtransformer
- To understand computation and predetermination of regulation of a 1-ϕtransformer
- To know about basics of three phasecircuits
- To distinguish between phase voltages, currents, line values and phasevalues
- To distinguish between balanced and unbalanced three phase circuits and powermeasurement

UNIT-IV

3-Phase InductionMotors: Polyphase Induction Motors-Construction Details and Applications of Cage and Wound Rotor Machines- - Principle of Operation – Slip- Rotor Emf and Rotor Frequency - Torque Equation- Torque Slip Characteristics – Losses andefficiency.

Learning Outcomes:

- To know about principle of operation of three phase inductionmotor
- To distinguish between squirrel cage and slip ring inductionmotors
- To know about various losses and computation of efficiency of inductionmotor
- To know about the torque developed by the inductionmotor
- To understand various characteristics of inductionmotor

UNIT–V

Synchronous Machines: Principle and Constructional Features of Salient Pole and Round Rotor Machines – E.M.F Equation- Applications , Voltage Regulation by Synchronous Impedance Method- Theory of Operation of Synchronous Motor.

Learning Outcomes:

- To know about principle of working ofalternator
- To distinguish between salient pole and cylindrical rotor machines
- To know about emfequation
- To know about predetermination of regulation of alternator by synchronous impedance method
- To know about principle of operation of synchronousmotor

TEXT BOOKS:

1. I.J.Nagrath&D.P.Kothari, "Electric Machines", 7th Edition, Tata McGraw Hill,2005
2. T.K.Nagsarkar and M.S. Sukhija, " Basic Electrical Engineering", 3rd Edition, Oxford UniversityPress2017.

REFERENCE BOOKS:

1. B. R. Gupta, "Fundamentals of Electric Machines", VandanaSinghal, 3rd Edition, New age International Publishers,2005.
2. S. Kamakashiah, "Electromachanics – III", overseas publishers Pvt.Ltd.
3. V.K. Mehta and Rohit Mehta, "Principles of Electrical Engineering", S.Chand Publications,2005.

COURSE OUTCOMESS:

After completing the course, the student should be able to:

1. Calculate the e.m.f. generated on DC Generator also able to control speed of different DC motors.
2. Conduct open circuit and short circuit tests on single phase transformer for knowing their characteristics.
3. Analyse three phase circuits, three induction motor operating principle and know their torque slip characteristics.
4. Able to have knowledge on synchronous machine with which he/she can able to apply the above conceptual things to real-world problems and applications

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

COLLEGE OF ENGINEERING (Autonomous) PULIVENDULA

II B.Tech I Sem (E.C.E) **L – T – P – C** **0 - 0 – 3 – 1.5**

ELECTRONIC DEVICES AND CIRCUITS LABORATORY

COURSE OBJECTIVES: -

1. To verify the VI Characteristics of PN Junction Diode, Zener Diode, FET, SCR & UJT
2. To demonstrate the working of Half Wave and Full Wave Rectifiers without and with filters.
3. To analyze the characteristics of BJT and FET in various configurations.
4. Differentiate the working of BJT and FET as amplifier in various configurations.

List of Experiments: (Any 12 Experiments are to be conducted)

1. P-N Junction Diode Characteristics
2. Zener Diode Characteristics
3. Half Wave Rectifiers (without and with filter)
4. Full Wave Rectifiers (without and with filter)
5. CB Characteristics
6. CE Characteristics
7. CC Characteristics
8. FET Characteristics
9. SCR Characteristics
10. UJT Characteristics
11. CE Amplifier
12. CC Amplifier
13. FET-CS Amplifier
14. FET –CD Amplifier

COURSE OUTCOMESS:-

After completion of this laboratory students will be able to

1. Use PN Junction Diode, Zener Diode, FET, SCR & UJT for practical applications.
2. Demonstrate the working of Half Wave and Full Wave Rectifiers without and with filters.
3. Analyze the characteristics of BJT and FET in various configurations.
4. Differentiate the working of BJT and FET as amplifier in various configurations.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

COLLEGE OF ENGINEERING (Autonomous) PULIVENDULA

II B.Tech I Sem (E.C.E) **L – T – P – C** **0 – 0 – 2 – 1**

SIGNALS AND SYSTEMS LAB

List of Experiments:

COURSE OBJECTIVES:

1. To provide practical exposure to generate and simulate basic signals.
2. To analyze signals and sequences using Fourier, Laplace and Z-transforms.
3. To write programs for signal processing applications.

List of Experiments:

1. Write a program to generate various Signals and Sequences
2. Write a program to perform operations on Signals and Sequences
3. Write a program to find the trigonometric & exponential Fourier series coefficients of a rectangular periodic signal and reconstruct the signal.
4. Write a program to find Fourier transform of a given signal. Write a program to convolve two discrete time sequences.
5. Write a program to find autocorrelation and cross correlation of given sequences.
6. Write a program to verify Linearity and Time Invariance properties of a given Continuous/Discrete System.
7. Write a program to generate discrete time sequence.
8. Write a program to find magnitude and phase response of first order low pass and high pass filter.
9. Write a program to find response of a low pass filter and high pass filter, when a speech signal is passed through these filters.
10. Write a program to generate Complex Gaussian noise and find its mean, variance, PDF and PSD.
11. Generate a Random data (with bipolar) for a given data rate .
12. To plot pole-zero diagram in S-plane/Z-plane of given signal/sequence and verify its stability.

Note:

- All the experiments are to be simulated using MATLAB or equivalent software.

COURSE OUTCOMES:

After completion of this laboratory students will be able to

1. Generate signals and sequences to the systems to perform various operations.
2. Analyze signals using Fourier, Laplace and Z-transforms.
3. Write programs for signal processing applications.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR
COLLEGE OF ENGINEERING (Autonomous) PULIVENDULA

II B.Tech I Sem (E.C.E) **L – T – P – C** **0 – 0 – 2 – 1**

ELECTRICAL TECHNOLOGY LAB

COURSE OBJECTIVES:

1. To do experiments on DC generators and DC motors
2. To do experiments on 1-ϕ transformer
3. To do power measurements in 3-ϕ balanced and unbalanced circuits
4. To do tests on 3-ϕ Induction motors
5. To do experiment on Alternator
6. To do experiment on Synchronous motor

List of Experiments:

1. OCC of a separately excited DC generator
2. Load characteristics of DC shunt generator
3. Load characteristics of DC shunt motor
4. Swinburne’s test
5. Speed control of DC shunt motor
6. OC & SC tests on a 1-ϕ transformer
7. Measurement of Active and reactive powers in a 3-ϕ balanced circuit
8. Measurement of 3-ϕ power using two wattmeter method in unbalanced circuit
9. Load test on Squirrel cage Induction motor
10. Load test on Slip ring Induction motor
11. Predetermination of regulation of alternator by Synchronous impedance method
12. V and Inverted V curves of Synchronous motor

Note: Student has to perform at least 10 experiments

COURSE OUTCOMES:

1. To understand various characteristics of DC generators and DC motors
2. To predetermine the efficiency and regulation of a 1-ϕ transformer
3. To know power measurement in 3-ϕ circuits
4. To understand various characteristics of Induction motors, Synchronous machines

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR
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Constitution of India

Course Objectives:

1. To enable the student to understand the importance of constitution.
2. To understand philosophy of fundamental rights and duties.
3. To understand the structure of executive, legislature and judiciary.
4. To understand the autonomous nature of constitutional bodies like Supreme Court and high court controller and auditor general of India and election commission of India.
5. To understand the central and state relation financial and administrative.

UNIT-I

Introduction to Indian Constitution: Constitution' meaning of the term, Indian Constitution - Sources and constitutional history, Features - Citizenship, Preamble, Fundamental Rights and Duties, Directive Principles of State Policy.

Learning Outcomes:

At the end of this unit students will be able to:

1. Understand the concept of Indian constitution.
2. Apply the knowledge on directive principle of state policy.
3. Analyze the History, features of Indian constitution.
4. Evaluate Preamble Fundamental Rights and Duties.

UNIT-II

Democratic forms of Constitution, Union Government and its Administration Structure of the Indian Union: Centre- State relationship, President: Role, power and position, PM and Council of ministers, Cabinet and Central Secretariat, Lok Sabha, Rajya Sabha, The Supreme Court and High Court: Powers and Functions;

Learning Outcomes:

At the end of this unit students will be able to:

1. Understand the structure of Indian government.
2. Differentiate between the state and central government.
3. Explain the role of President and Prime Minister.
4. Know the Structure of supreme court and High court.

UNIT-III

Federalism, Political relations, Financial relations of State Government and its Administration Governor - Role and Position - CM and Council of ministers, State Secretariat: Organisation, Structure and Functions.

Learning Outcomes:

At the end of this unit students will be able to:

1. Understand the structure of state government.
2. Analyze the role Governor and Chief Minister.
3. Explain the role of state Secretariat.
4. Differentiate between structure and functions of state secrateriate.

UNIT-IV

A. Local Administration - District's Administration Head - Role and Importance, Municipalities - Mayor and role of Elected Representative - CEO of Municipal Corporation PachayatiRaj: Functions PRI: Zila Panchayat, Elected officials and their roles, CEO Zila Panchayat: Block level Organizational Hierarchy - (Different departments), Village level - Role of Elected and Appointed officials - Importance of grass root democracy.

Learning Outcomes:

At the end of this unit students will be able to:

1. Understand the local Administration.
2. Compare and contrast district administration role and importance.
3. Analyze the role of Myer and elected representatives of Municipalities.
4. Evaluate Zilla panchayat block level Organisation.

UNIT-V

Election Commission: Election Commission- Role of Chief Election Commissioner and Election Commissionerate , State Election Commission, Supreme Court, High Court.

Learning Outcomes:

At the end of this unit students will be able to:

1. Know the role of Election Commission apply knowledge.
2. Contrast and compare the role of Chief Election commissioner and Commissiononerate.
3. Analyze role of state election commission.
4. Evaluate various commissions of viz SC/ST/OBC and women.

REFERENCES:

1. Durga Das Basu, Introduction to the Constitution of India, Prentice – Hall of India Pvt. Ltd.. New Delhi.
2. Subash Kashyap, Indian Constitution, National Book Trust.
3. J.A. Siwach, Dynamics of Indian Government & Politics.
4. D.C. Gupta, Indian Government and Politics.
5. H.M.Sreevai, Constitutional Law of India, 4th edition in 3 volumes (Universal Law Publication.
6. J.C. Johari, Indian Government and Politics Hans.

Course Outcomes:

1. Understand historical background of the constitution making and its importance for building a democratic India.
2. Understand the functioning of three wings of the government ie., executive, legislative and judiciary.
3. Understand the value of the fundamental rights and duties for becoming good citizen of India.
4. Analyze the decentralization of power between central, state and local self-government.
5. Apply the knowledge in strengthening of the constitutional institutions like CAG, Election Commission and UPSC for sustaining democracy.

6. Know the sources, features and principles of Indian Constitution.
7. Learn about Union Government, State government and its administration.
8. Get acquainted with Local administration and Pachayati Raj.
9. Be aware of basic concepts and developments of Human Rights.
10. Gain knowledge on roles and functioning of Election Commission.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

COLLEGE OF ENGINEERING (Autonomous) PULIVENDULA

II B.Tech II Sem (E.C.E) **L – T – P – C** **3 – 0 – 0 – 3**

PROBABILITY THEORY AND STOCHASTIC PROCESSES

COURSE OBJECTIVES:

1. To study the probability theory and operations on single random variable.
2. To understand multiple random variables and operations on them.
3. To gain knowledge of random processes and their temporal characteristics.
4. To describe spectral characteristics of random processes.
5. To analyze the linear systems with stationary random process as input.

UNIT I

Probability: Probability introduced through sets and relative frequency: experiments and sample spaces, discrete and continuous sample spaces, events, probability definitions and axioms, mathematical model of experiments, probability as a relative frequency, joint probability, conditional probability, total probability, Bayes' theorem, independent events, problem solving.

The Random Variable: Definition of a random variable, conditions for a function to be a random variable, discrete, continuous, mixed random variable, distribution and density functions, binomial, Poisson, uniform, Gaussian, exponential, Rayleigh, conditional distribution, conditional density, properties. Expectation of a random variable, moments-moments about the origin , central moments, variance and skew, Chebyshev's inequality, moment generating function, characteristic function, problem solving.

Learning Outcomes:

At the end of the unit, the student will be able to

- Understand the concept of probability theory and random variables.
- Solve problems related to single random variable and operations on them.

UNIT II

Multiple Random Variables: Vector random variables, joint distribution function, properties of joint distribution, marginal distribution functions, conditional distribution and density – point conditioning, interval conditioning, statistical independence, sum of two random variables, sum of several random variables, central limit theorem, (proof not expected), unequal distribution, equal distributions.

Operations on Multiple Random Variables: Expected value of a function of random variables, joint moments about the origin, joint central moments, joint characteristic functions, jointly Gaussian random variables: two random variables case, n random variable case, properties of Gaussian random variables, transformations of multiple random variables.

Learning Outcomes:

At the end of the unit, the student will be able to

- Gain knowledge on multiple random variables.
- Evaluate statistical properties of multiple random variables.

UNIT III

Random Processes-Temporal Characteristics: The random process concept, classification of processes, deterministic and nondeterministic processes, distribution and density functions, concept of stationarity and statistical independence, first-order stationary processes, second-order and wide-sense stationarity, n-order and strict-sense stationarity. Time averages and Ergodicity, mean-Ergodic processes, correlation-Ergodic processes, autocorrelation function and its properties, cross-correlation function and its properties, covariance functions, Gaussian random processes, Poisson random process.

Learning Outcomes:

At the end of the unit, the student will be able to

- Understand the concept of random processes and Ergodic random processes.
- Analyze the concepts and properties of auto correlation and cross correlation.

UNIT IV

Random Processes-Spectral Characteristics: The power density spectrum and its properties, relationship between power spectrum and autocorrelation function, the cross-power density spectrum and its properties, relationship between cross-power spectrum and cross-correlation function.

Learning Outcomes:

At the end of the unit, the student will be able to

- Understand and analyze spectral characteristics of random processes.
- Learn the relationship between power spectrum and correlation.

UNIT V

Random Signal Response Of Linear Systems: System response – convolution, mean and mean squared value of system response, autocorrelation function of response, cross- correlation functions of input and output, spectral characteristics of system response: power density spectrum of response, cross-power density spectrums of input and output, band pass, band limited and narrowband processes, properties.

Noise Definitions: White Noise, colored noise and their statistical characteristics, Ideal low pass filtered white noise, RC filtered white noise.

Learning Outcomes:

At the end of the unit, the student will be able to

- Analyze the response of linear systems for random inputs.
- Understand the concepts of noise and their statistical characteristics.

TEXT BOOKS:

1. Peyton Z. Peebles, "Probability, Random Variables & Random Signal Principles", 4th Edition, TMH,2002.

2. Athanasios Papoulis and S. UnnikrishnaPillai, "Probability, Random Variables and Stochastic Processes", 4th Edition, PHI,2002.

REFERENCES:

1. Simon Haykin, "Communication Systems", 3rd Edition, Wiley,2010.
2. Henry Stark and John W.Woods, "Probability and Random Processes with Application to Signal Processing," 3rd Edition, Pearson Education,2002.
3. George R. Cooper, Clave D. MC Gillem, "Probability Methods of Signal and System Analysis," 3rd Edition, Oxford,1999.

COURSE OUTCOMES:

After completion of the course, the student will be able to:

1. Understand the probability theory and operations on single random variable.
2. Perform operations on multiple random variables.
3. Gain knowledge of random processes and their temporal characteristics.
4. Describe spectral characteristics of random processes.
5. Analyze the linear systems with stationary random process as input.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

COLLEGE OF ENGINEERING (Autonomous) PULIVENDULA

II B.Tech II Sem (E.C.E) **L – T – P – C** **3 – 0 – 0 – 3**

ELECTRONIC CIRCUIT ANALYSIS AND DESIGN

COURSE OBJECTIVES:

1. To gain the knowledge of analysis of BJT amplifiers at high frequencies.
2. To study about the multistage amplifiers and their performance characteristics.
3. To understand the effect of negative feedback on amplifier characteristics.
4. To learn the basic principles and working of oscillator circuits.
5. To get a basic idea about large signal amplifiers and tuned amplifiers.

UNIT I

High Frequency Response: Logarithms, Decibels, General Frequency considerations, Analysis of BJT amplifiers at High Frequencies, Effect of Coupling and bypass Capacitors, The Hybrid-pi (π)- Common Emitter Transistor Model, CE short Circuit Current gain, Current gain with Resistive Load, Single Stage CE Transistor Amplifier response, Gain-Bandwidth Product, Emitter follower at higher frequencies, Illustrative design problems.

Learning Outcomes:

At the end of the unit, the student will be able to

- Understand the concepts and equivalent circuit models of BJT at high frequencies.
- Analyze high frequency models and performance parameters of BJT amplifier circuits.

UNIT II

Multistage Amplifiers: Classification of Amplifiers- Distortion in amplifiers, Analysis of CE amplifier with Emitter Resistance and Emitter follower, Different Coupling Schemes used in Amplifiers – RC Coupled Amplifier, Direct and Transformer Coupled Amplifiers, Frequency Response of BJT Amplifier, Design of Single stage RC Coupled Amplifier Using BJT, Analysis of Cascaded RC Coupled BJT Amplifiers, Darlington Pair, Cascode Amplifier,Illustrative problems.

Learning Outcomes:

At the end of the unit, the student will be able to

- Analyse the inter-stage coupling and performance parameters of multistage amplifiers.
- Design multiple stage amplifier circuits.

UNIT III

Feedback Amplifiers: Concepts of Feedback, Classification of Feedback Amplifiers, General Characteristics of Negative Feedback Amplifiers, Effect of Feedback on Amplifier characteristics, Voltage Series, Voltage Shunt, Current Series and Current Shunt Feedback Configurations, Illustrative design Problems.

Learning Outcomes:

At the end of the unit, the student will be able to

- Understand the concept of feedback and determine itson amplifier characteristics.
- Analyse the characteristics of various types of feedback configurations.

UNIT IV

Oscillators: Conditions for Oscillations, RC and LC type Oscillators, RC-Phase shift and Wien-Bridge Oscillators, Generalized Analysis of LC Oscillators, Hartley and Colpitts Oscillators, Crystal Oscillators, Frequency and Amplitude Stability of Oscillators, Illustrative design problems.

Learning Outcomes:

At the end of the unit, the student will be able to

- Understand the basic working principle of oscillator.
- Analyse different types of oscillators circuits.

UNIT V

Power Amplifiers: Classification, Series fed Class A Power Amplifier, Transformer Coupled Class A Amplifier, Efficiency, Push Pull Amplifier- Complementary Symmetry Class-B Power Amplifier, Amplifier Distortion, Power Transistor Heat sinking, Class C and Class D Power amplifiers, Illustrative design problems.

Introduction to Tuned amplifiers: Q-Factor, Single tuned, double tuned and stagger tuned amplifiers.

Learning Outcomes:

At the end of the unit, the student will be able to

- Know about common classes of power amplifier and their basic characteristics.
- Evaluate the resonant frequency and analyse the characteristics of tuned amplifiers.

TEXT BOOKS:

1. Integrated Electronics, Jacob Millman, Christos C Halkias, 2nd Edition, McGraw Hill, 2002.
2. Electronic Devices and Circuit Theory, Robert L.Boylestad, Louis Nashelsky, 9th Edition, Pearson, 2008.

REFERENCE BOOKS:

1. Electronic Circuit Analysis, K.Lal Kishore, 2nd Edition, BSP, 2004.
2. Electronic Circuits Analysis and Design, Donald A Neamen, 3rd Edition, Tata McGraw-Hill, 2009.
3. Microelectric circuits, Sedra, Kenneth, Smith, 5th Edition, Oxford University Press, 2011.

4. Electronic Circuit and Applications, Mohammad H. Rashid, 3rd Edition, CENGAGE Learning, 2009..
5. Introductory Electronic Devices and Circuits, Robert T. Paynter, 7th edition, PEI, 2009.

COURSE OUTCOMES:

After the completion of the course, students will be able to

1. Gain the knowledge of high frequenciesanalysis of BJT amplifiers.
2. Know about the multistage amplifiers and their performance characteristics.
3. Understand the effect of negative feedback on amplifier characteristics.
4. Explain the basic principles and working of oscillator circuits.
5. Describe about the large signal amplifiers and tuned amplifiers.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

COLLEGE OF ENGINEERING (Autonomous) PULIVENDULA

II B.Tech II Sem (E.C.E) **L – T – P – C 3 – 0 – 0 – 3**

EM WAVES AND TRANSMISSION LINES

COURSE OBJECTIVES:

1. To understand and analyze different laws and theorems of electrostatic fields.
2. To study and analyze different laws and theorems of magnetostatic fields.
3. To analyze Maxwell's equations in different forms.
4. To learn the concepts of wave theory and its propagation through various mediums.
5. To get an exposure to the properties of transmission lines.

UNIT I

Electrostatics: Review of Vector algebra, Co-ordinate systems & transformation, Vector calculus, Coulomb's Law, Electric Field Intensity – Fields due to Different Charge Distributions, Electric Flux Density, Gauss Law and Applications, Electric Potential, Relations Between E and V, Maxwell's Two Equations for Electrostatic Fields, Electric dipole, Energy Density, Convection and Conduction Currents, Dielectric Constant, Continuity Equation, Relaxation Time, Poisson's and Laplace's Equations, Capacitance – Parallel Plate, Coaxial, Spherical Capacitors, Illustrative Problems.

Learning Outcomes:

At the end of the unit, the student will be able to

- Understand vector algebra, vector calculus andconcepts related to electrostatic Fields.
- Analyze and solve the problems related to electrostatic fields.

UNIT II

Magneto statics: Biot-Savart Law, Ampere's Circuital Law and Applications, Magnetic Flux Density, Maxwell's Two Equations for Magneto static Fields, Magnetic Scalar and Vector Potentials, Forces due to Magnetic Fields, Magnetic torque and moment, Magnetic dipole, Inductances and Magnetic Energy, Illustrative Problems.

Learning Outcomes:

At the end of the unit, the student will be able to

- Comprehend the laws, concepts and proofs related to Magnetostatic Fields.
- Analyze and solve the problems related to magnetic fields.

UNIT III

Maxwell's Equations : Faraday's Law and Transformer e.m.f, Inconsistency of Ampere's Law and Displacement Current Density, Maxwell's Equations in Different Final Forms and Word Statements. Boundary Conditions of Electromagnetic fields: Dielectric-Dielectric and Dielectric-Conductor Interfaces, Illustrative Problems.

Learning Outcomes:

At the end of the unit, the student will be able to

- Understand the significance and utility of Maxwell's Equations.
- Appreciate the importance of boundary conditions in electromagnetics.

UNIT-IV

EM Wave Characteristics: Wave Equations for Conducting and Perfect Dielectric Media, Uniform Plane Waves ,All Relations between E & H, Sinusoidal Variations, Wave Propagation in Lossless and Conducting Media, Wave Propagation in Good Conductors and Good Dielectrics, Skin depth, physical significance of Skin Depth,Reflection and Refraction of Plane Waves – Normal and Oblique Incidences, for both Perfect Conductor and Perfect Dielectrics, Brewster Angle, Critical Angle and Total Internal Reflection, Surface Impedance, Poynting Vector and Poynting Theorem – Applications, Illustrative Problems.

Learning Outcomes:

At the end of the unit, the student will be able to

- Analyze the characteristics of Uniform Plane Waves (UPW)
- Understand the propagation of electromagnetic waves in different media.

UNIT-V

Transmission Lines: Types, Transmission line parameters (Primary and Secondary), Transmission line equations, Input impedance, Standing wave ratio & power, Smith chart & its applications, Applications of transmission lines of various lengths, Basics of waveguides and resonators. Illustrative Problems.

Learning Outcomes:

At the end of the unit, the student will be able to

- Determine the basic transmission line equations and their characteristics,
- Understand the smith chart and its applications.

TEXT BOOKS:

1. Elements of Electromagnetics, Matthew N.O. Sadiku, 4th Edition, Oxford University Press, 2008.
2. Electromagnetic Waves and Radiating Systems, E.C. Jordan and K.G. Balmain, 2nd Edition, PHI, 2000.

REFERENCES:

1. Engineering Electromagnetics, William H. Hayt Jr. and John A. Buck, 7th Edition, Tata McGraw Hill, 2006.
2. Electromagnetics, John D. Krauss, 3rd Edition, McGraw Hill, 1988.
3. Networks, Lines, and Fields, John D. Ryder,2nd Edition, PHI publications, 2012.
4. Electromagnetic Field Theory and Transmission Lines, G. S. N. Raju, 2nd Edition, Pearson Education, 2013.

COURSE OUTCOMES:

At the end of this course the student will be able to:

1. Analyze and apply the laws & theorems of electrostatic fields to solve the problems.
2. Gain proficiency in the analysis and application of magnetostatic laws and theorems.
3. Analyze Maxwell's equations in different forms.
4. Learn the concepts of wave theory and its propagation through various mediums.
5. Understand the properties of transmission lines and their applications.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

COLLEGE OF ENGINEERING (Autonomous) PULIVENDULA

II B.Tech II Semester (E.C.E) **L – T – P – C 3 – 0 – 0 – 3**

ANALOG COMMUNICATIONS

COURSE OBJECTIVES:

1. To gain an understanding of basics of analog communication systems, various amplitude modulation and demodulation techniques
2. To study different types of angle modulation and demodulation schemes.
3. To learn and analyze the effects of noise for different modulation techniques.
4. To understand different pulse modulation schemes, radio transmitters and receivers
5. To acquire the knowledge about information theory and channel coding.

UNIT I

Introduction: Elements of communication systems, Information, Messages and Signals, Modulation, Modulation Methods, Modulation Benefits and Applications.

Amplitude Modulation & Demodulation: Baseband and carrier communication, Amplitude Modulation (AM), Side band and carrier power of AM, Generation of amplitude modulated wave- square law Modulator, switching Modulator, Demodulation of AM Waves- Envelope detector, Rectifier detector, Suppressed carrier Modulation, Double sideband suppressed carrier (DSB-SC) Modulation, Generation of DSB-SC signals- Balanced Modulator, Ring Modulator, Demodulation of DSB-SC signals- Synchronous detector, Quadrature amplitude modulation (QAM), Single side band suppressed carrier (SSB-SC) Modulation, Generation of SSB-SC signals-Frequency & Phase discrimination methods, Demodulation of SSB-SC signals-Synchronous detector, Vestigial sideband (VSB) modulation & demodulation, Frequency mixer.

Learning Outcomes:

At the end of the unit, the student will be able to

- Understand the basic concepts of the analog communication systems.
- Appreciate the uses and applications of different amplitude modulation and demodulation techniques

UNIT II

Angle Modulation &Demodulation: Concept of instantaneous frequency, Generalized concept of angle modulation, Bandwidth of angle modulated waves – Narrow band frequency modulation (NBFM); and Wide band FM (WBFM), Phase modulation, Features of angle modulation, Generation of FM waves – Indirect method, Direct generation; Demodulation of FM, Band pass limiter, Practical frequency demodulators, Power Spectral density, Pre-emphasis & De-emphasis filters, FM receiver, FM Capture Effect, Illustrative Problems.

Learning Outcomes:

At the end of the unit, the student will be able to

- Learn the concepts of frequency modulation and phase modulation
- Compare NBFM and WBFM, analyze FM and PM.

UNIT III

Noise in Communication Systems: Thermal noise, Properties of Thermal Noise, Time domain representation of narrowband noise, Filtered white noise, Quadrature representation of narrowband noise, Envelope of narrowband noise plus sine wave, Signal to noise ratio & probability of error, Noise equivalent bandwidth, Effective noise temperature, and Noise figure, Baseband systems with channel noise, Performance analysis of AM, DSB-SC, SSB-SC, FM, PM in the presence of noise, Illustrative Problems.

Learning Outcomes:

At the end of the unit, the student will be able to

- Know about different types of noise and their effects.
- Analyze the performance of different modulation methods in the presence of noise.

UNIT IV

Analog pulse modulation schemes: Pulse amplitude modulation (PAM) & demodulation, Pulse-Time Modulation – Pulse Duration and Pulse Position modulations, and demodulation schemes, Illustrative Problems.

Radio Transmitters and Receivers:AM Transmitter, FM Transmitter, Super-heterodyne AM and FM receiver, Sensitivity, Selectivity, Image rejection ratio and fidelity.

Learning Outcomes:

At the end of the unit, the student will be able to

- Understand different types of analog pulse modulation methods.
- Gain knowledge on radio transmitters and receivers.

UNIT- V

Information Theory & Channel Coding: Introduction, Information content of message, Entropy, Entropy of symbols in long independent and dependent sequences, Entropy and information rate of Mark off sources, Shannon's encoding algorithm, Huffman coding, Discrete communication channels, Rate of information over a discrete channel, Capacity of discrete memory less channels, Discrete channels with memory, Shannon – Hartley theorem and its implications, Illustrative problems.

Learning Outcomes:

At the end of the unit, the student will be able to

- Understand the concepts of information theory and coding techniques.
- Derive the channel capacity and design the channel performance.

TEXT BOOKS:

1. Simon Haykin, "Communication Systems", 3rd edition, Wiley-India edition, 2010.
2. B. P. Lathi, "Modern Digital and Analog Communication Systems," 3rd Edition, Oxford Univ. press, 2006.

3. A. Bruce Carlson, & Paul B. Crilly, "Communication Systems – An Introduction to Signals & Noise in Electrical Communication", 5th Edition, McGraw-Hill International Edition, 2010.

REFERENCES:

1. Herbert Taub, Donald L Schilling, "Principles of Communication Systems", 3rd Edition, Tata McGraw-Hill, 2009.
2. George Kennedy, Bernard Davis, "Electronics & Communication System", 3rd Edition, Tata McGraw Hill, 2004.

COURSE OUTCOMES:

At the end of this course the student will be able to:

1. Understand the basics of analog communication systems, various amplitude modulation and demodulation techniques
2. Gain the knowledge of different types of angle modulation and demodulation schemes.
3. Analyze the effects of noise for different modulation techniques.
4. Comprehend different pulse modulation schemes, radio transmitters and receivers
5. Acquire the knowledge about information theory and channel coding.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

COLLEGE OF ENGINEERING (Autonomous) PULIVENDULA

II B.Tech II Semester (E.C.E) **L – T – P – C 3 – 0 – 0 – 3**

LINEAR INTEGRATED CIRCUITS & APPLICATIONS

COURSE OBJECTIVES:

1. To study differential amplifiers and their characteristics, characteristics of Op-amp and its applications.
2. To understand the operation of op-amp with negative feedback and its frequency response.
3. To design and analyze amplifiers, filters and converters
4. To develop oscillators and Multivibrators using Linear IC's.
5. To learn about various techniques to design A/D and D/A convertors.

UNIT I

Differential Amplifiers: Basic BJT and FET Differential Amplifiers and its qualitative description, Differential amplifier configurations Balanced and unbalanced output differential amplifiers, current mirror, level translator.

Operational Amplifiers: Classification of IC's, Package Types, Op-amp Block diagram, Ideal Op-Amp, Equivalent circuit, Voltage Transfer curve, open loop op-amp configurations, 741 Op-Amp and its features, Introduction to dual OP-AMP TL082 as a general purpose JFET-input Operational Amplifier.

Learning Outcomes:

At the end of the unit, the student will be able to

- Understand the differential amplifiers and their characteristics.
- Analyze the linear and non-linear applications of operational amplifiers.

UNIT II

OP-AMP with Negative Feedback and Frequency Response: Introduction, feedback configurations, voltage series feedback, voltage shunt feedback and differential amplifiers, properties of Practical op-amp.

Frequency Response: Introduction, compensating networks, frequency response of internally compensated op-amps and non-compensated op-amps, High frequency op-amp equivalent circuit, open loop gain vs frequency, close loop frequency response, circuit stability, slew rate.

Learning Outcomes:

At the end of the unit, the student will be able to

- Learn the feedback configurations of OP-AMP.
- Explain the frequency response of op-amp circuits.

UNIT III

OP-AMP Applications-1

DC and AC amplifiers, peaking amplifiers, summing, scaling and averaging amplifiers, instrumentation amplifier, voltage to current converter, current to voltage converter, integrator, differentiator, active filters, First, Second and Third order Butterworth filter and its frequency response, Tow-Thomas bi-quad filter.

Learning Outcomes:

At the end of the unit, the student will be able to

- Design and analyze different amplifiers using op-amp.
- Understand the working of converters and filters using op-amp.

UNIT-IV

OP-AMP Applications-2

Oscillators: Phase shift and Wien bridge oscillators, square, triangular and sawtooth wave generators, comparators, Zero crossing detector, Schmitt trigger, Characteristics and limitations.

Specialized applications: 555 timer IC (Monostable& Astable operation) & its applications, PLL operating principles, Monolithic PLL, applications, analog amplifier and phase detection, Wide bandwidth precision analog multiplier MPY634 and its applications.

Learning Outcomes:

At the end of the unit, the student will be able to

- Design oscillators using op-amps.
- Learn the design of Multivibrators and PLL's using timer IC.

UNIT V

Analog to Digital and Digital to Analog Converters: Analog and Digital Data Conversions, D/A Converters – specifications, Weighted resistor type, R-2R ladder type ,Voltage Mode and Current Mode R-2R ladder types, switches for D/A Converters, High speed sample and hold circuits, A/D Converters –specifications, Flash type, Successive Approximation type, Single slope type, Dual slope type, A/D Converter using Voltage to Time Conversion, Over sampling A/D Converters..

Learning Outcomes:

At the end of the unit, the student will be able to

- Learn the techniques for designing Digital to Analog Converters.
- Implement Analog to Digital Converters in different methods.

TEXT BOOKS:

1. D.RoyChowdhury, "Linear integrated circuits", 2nd Edition, New Age International (P) Ltd, 2003.
2. Ramakanth A.Gayakwad,"Op-amps and Linear ICs", 4th Edition, PHI, 1987.
3. TL082 Data sheet: http://www.ti.com/lit/ds/symlink/tl082.pdf

REFERENCES:

1. R.F.Coughlin and Fredrick Driscoll, "Op-amps and Linear ICs", 6th Edition, PHI.
2. David A.Bell, "Op-amps and Linear ICs", 2nd Edition, Oxford University press, 2010.

COURSE OUTCOMES:

At the end of this course the student will be able to:

1. Learn about differential amplifiers and their characteristics, characteristics of Op-amp and its applications.
2. Understand the operation of op-amp with negative feedback and its frequency response.
3. Design and analyze amplifiers, filters and converters
4. Develop oscillators and Multivibrators using Linear IC's.
5. Study various techniques to design A/D and D/A convertors.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

COLLEGE OF ENGINEERING (Autonomous) PULIVENDULA

II B.Tech II Semester (E.C.E) **L – T – P – C3 – 0 – 0 – 3**

DIGITAL INTEGRATED CIRCUITS & APPLICATIONS

COURSE OBJECTIVES:

1. To introduce digital logic families and interfacing concepts for implementing digital systems.
2. To gain knowledge on VHDL fundamentals, compilers, simulators and synthesis tools.
3. To design and implement different combinational logic circuits.
4. To understand how to implementsequential logic circuits.
5. To get a comprehensive idea about different types of memories.

UNITI

CMOS Logic: Introduction to logic families, CMOS logic, CMOS steady stateelectrical behavior, CMOS dynamic electrical behavior, CMOS logic families.

Bipolar Logic And Interfacing: Bipolar logic, Transistor logic, Transistor-transistor logic (TTL) families,Integrated injection logic (I^2L), CMOS/TTL interfacing, low voltage CMOS logic and interfacing, Emittercoupled logic, Comparison of logic families, Familiarity with standard 74XXand CMOS 40XX seriesICs, Specifications.

Learning Outcomes:

At the end of the unit, the student will be able to

- Understand the structure of digital integrated circuit families and their characteristics.
- Learn how to interface different logic families.

UNIT II

The VHDL Hardware Description Language: Design flow, program structure,types and constants, functions and procedures, libraries and packages.

The VHDL design elements: Structural design elements, behavioral designelements, time dimension and simulation synthesis.

Learning Outcomes:

At the end of the unit, the student will be able to

- Learn the Hardware Description Language (VHDL).
- Model the complex digital systems at different levels of abstractions.

UNITIII

Combinational Logic Design: Decoders (74x138), Dual Decoder (74x139), 8 to 3 Encoders, Priority Encoder (74x148), three state devices, multiplexers (74x151) and de-multiplexers (74x155), Code Converters, EX-OR gates and parity circuits, comparators (74x85), adders

&subtractors, ALUs, Combinational multipliers, Design considerations of the above mentioned combinational logic digital IC's, VHDL models for the above ICs.

Learning Outcomes:

At the end of the unit, the student will be able to

- Understand the implementation of different combinational logic circuits.
- Design and analyze combinational logic circuits using VHDL.

UNIT- IV

Sequential logic Design: Latches & flip flops, counters (74x163), shift register (74x164 and 74x166)and PLDs.Design considerations of the above mentioned sequential logic digital IC's, VHDL models for the above ICs. Design process of FSM: Moore and Mealy machines and their VHDL models, Synchronous design methodology and it's impediments.

Learning Outcomes:

At the end of the unit, the student will be able to

- Acquire knowledge about differentsequential logic circuits.
- Implement sequential logic circuits using VHDL.

UNIT-V

ROMs: Internal Structure, 2D – decoding commercial types, timing and applications.

Static RAMs: Internal Structure, timing and standard SRAMs, Synchronous SRAMs.

Dynamic RAMs: Internal Structure, timing and standard DRAMs, Synchronous DRAMs.

Learning Outcomes:

At the end of the unit, the student will be able to

- Understand the internal architectures of ROM and RAM.
- Use ROM and RAM for different memory applications.

TEXT BOOKS:

1. John F. Wakerly, "Digital Design Principles & Practices," 3rd Edition, PHI/ Pearson Education Asia, 2005.
2. J. Bhasker, "A VHDL Primer," 3rd Edition, Pearson Education/ PHI.

REFERENCES:

1. Morris Mano M, Michael D. Ciletti, "Digital Design",Pearson Education, 4th Edition, 2007
2. Charles H. Roth Jr., "Digital System Design Using VHDL," 2nd Edition, PWS Publications, 2008.
3. Stephen Borwn and ZvonkoVramesic, "Fundamentals of Digital Logic with VHDL Design," 2nd Edition, McGraw Hill, 2005.

COURSE OUTCOMES:

At the end of this course the student will able to:

1. Learn about digital logic families and interfacing concepts for implementing digital systems.
2. Gain knowledge on VHDL fundamentals, compilers, simulators and synthesis tools.
3. Design and implement different combinational logic circuits.
4. Understand how to implement sequential logic circuits.
5. Get a comprehensive idea about different types of memories.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

COLLEGE OF ENGINEERING (Autonomous) PULIVENDULA

II B.Tech II Sem (E.C.E) **L – T – P – C** **0 – 0 – 3 – 1.5**

ELECTRONIC CIRCUIT ANALYSIS AND DESIGN LAB

COURSE OBJECTIVES:

1. To design, simulate and test single and multistage amplifiers.
2. To verify the effect of feedback on amplifier parameters.
3. To understand the functioning of oscillator circuits
4. To design and analyse power amplifiers and tuned amplifiers.

List of Experiments (Any 12 experiments to be done)

I) Design and Simulation in Simulation Laboratory using any Simulation Software. (Minimum of 6 Experiments):

1. Common Emitter Amplifier
2. Common Source Amplifier
3. A Two Stage RC Coupled Amplifier.
4. Current shunt and Voltage Series Feedback Amplifier
5. Cascade Amplifier
6. Wien Bridge Oscillator using Transistors
7. RC Phase Shift Oscillator using Transistors
8. Class A Power Amplifier (Transformer less)
9. Class B Complementary Symmetry Amplifier
10. High Frequency Common base (BJT) / Common gate (JFET) Amplifier.

II) Testing in the Hardware Laboratory (6 Experiments)

Any Three circuits simulated in Simulation laboratory

1. Class A Power Amplifier (with transformer load)
2. Class C Power Amplifier
3. Single Tuned Voltage Amplifier
4. Hartley &Colpitt's Oscillators.
5. Darlington Pair.
6. MOSFET Amplifier

COURSE OUTCOMES:

After completion of these laboratory students able to:

a. Design, simulate and test single and multistage amplifiers.
b. Verify the effect of feedback on amplifier parameters.
c. Learn the functioning of oscillator circuits
d. Design and analyse power amplifiers and tuned amplifiers.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

COLLEGE OF ENGINEERING (Autonomous) PULIVENDULA

II B.Tech II Sem (E.C.E) **L – T – P – C** **0 – 0 – 2 – 1**

ANALOG COMMUNICATIONS LAB

COURSE OBJECTIVES:

1. To gain an understanding on analog modulation and demodulation techniues.
2. To recognize the importance of pre-emphasis and de-emphasis.
3. To know the need for diode detector, and AGC.
4. To understand different pulse modulation and demodulation techniques.
5. To perform radio receiver measurements like sensitivity, selectivity and fidelity.

List of Experiments: (Any 10 Experiments are to be conducted)

1. Amplitude Modulation & Demodulation.
2. AM - DSB SC - Modulation & Demodulation.
3. Diode Detector.
4. Pre-emphasis & De-emphasis.
5. Frequency Modulation & Demodulation.
6. Automatic Gain Control Circuits.
7. Verification of Sampling Theorem.
8. Pulse Amplitude Modulation & Demodulation.
9. Pulse Width Modulation & Demodulation.
10. Pulse Position Modulation & Demodulation.
11. Phased Locked Loop.
12. Spectral analysis of modulated signals using Spectrum Analyzer.
13. Radio receiver measurements – sensitivity, selectivity and fidelity.

COURSE OUTCOMES:

After completion of the course the students will be able to

1. Gain an understanding on analog modulation and demodulation techniques.
2. Recognize the importance of pre-emphasis and de-emphasis.
3. Demonstrate the need for diode detector, and AGC.
4. Understand different pulse modulation and demodulation techniques.
5. Measure radio receiver characteristics like sensitivity, selectivity and fidelity.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

COLLEGE OF ENGINEERING (Autonomous) PULIVENDULA

II B.Tech II Sem (E.C.E) **L – T – P – C** **0 – 0 – 2 – 1**

INTEGRATED CIRCUITS & APPLICATIONS LAB

COURSE OBJECTIVES:

1. To design and analyze various applications of op-amp and waveform generation circuits.
2. To get exposure to design and analysis of multivibrators and filters.
3. To get the knowledge about functionality of A/D and D/A converters.
4. To use computer-aided design tools for development of complex digital logic circuits
5. To understand the functionality of various Digital ICs.

Part A: Linear IC Applications

List of Experiments: (any six using Hardware)

1. Differential Amplifer (BJT, FET)
2. Op-Amp applications-Adder, subtractor, comparator, Integrator, differentiator
3. Study the characteristics of negative feedback amplifier
4. Design of an Instrumentation amplifier
5. Monostable and Astable multivibrator using IC 555 Timer
6. Filter applications – LPF, HPF (First order)
7. Design of Analog filters (2nd order bandpass filter and Notch filter)
8. D/A Converters(R-2R Ladder)
9. A/D Converters (Successive Approximation)
10. Design of a function generator
11. Design of a Voltage Controlled Oscillator (VCO)
12. Design of a Phase Locked Loop (PLL)

Part-B: Digital IC Applications

List of Experiments: (any six using Software)

1. Realization of Logic Gates.
2. 4 to 8 Decoder- 74138.
3. 8 x 1 Multiplexer-74151 and 2 x 4 De-multiplexer-74155.
4. 4-Bit Comparator-7485.
5. D Flip-Flop-7474.
6. Decade counter-7490.
7. Shift registers-7495.

8. Universal shift register – 74194/74195
9. Priority encoder- 74LS148
10. ALU Design.

COURSE OUTCOMES:

After completion of the course the students will be able to

1. Design and analyze various applications of op-amps and waveform generation circuits.
2. Get exposure to design and analysis of Multivibrators and filters.
3. Understand the functionality of A/D and D/A converters.
4. Use computer-aided design tools for development of digital logic circuits
5. Learn the functionality of various Digital ICs.

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS):: PULIVENDULA
DEPARTMENT OF CHEMISTRY
II B.TECH – I/II SEMESTER Mandate Course (MC)
(THEORY)

Subject Code	Title of the Subject	L	T	P	C
	Environmental Science	3	0	-	0

COURSE OBJECTIVES	
1	To make the student understand multi disciplinary nature of environment and its components.
2	To investigate the relationship between human life and environment from scientific prospective.
3	To impart knowledge to the students about fundamental concepts of Ecosystem and Biodiversity
4	Necessasity of analyzing regional, national and global environmental problems
5	To understand and apply the fundamentals of Environmental science to important local, regional, national and global environmental problems and potential issues

COURSE OUTCOMES	
CO1	Able to solve the environmental problems based fundamental concepts of Environmental Science.
CO2	Enable the students to understand the structure and function of significant environmental systems
CO3	Knowledge of concepts makes them differentiate Natural and Polluted environment..
CO4	Enable to apply the Pyramid of number, mass and Energy, understand about Renweable energy resources. Illustrate the Forest ecosystem, Discuss about Grass and Net biomass productivity
CO5	Differentiate between Forest and desert Ecosystems, Critically evaluate arguments regarding environmental issues. Illustrate the Food chain and food web, Identify the applications of rain water harvesting, Interpret advantages of In-situ and Ex-situ conservation of biodiversity

Mapping between Course Outcomes and Programme Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1												
CO2												
CO3												
CO4												
CO5												

SYLLABUS

UNIT-I:

i) Multidisciplinary nature of environmental studies

The **Multidisciplinary** nature of environmental studies Definition; Scope and importance, Need for public awareness.

ii) Natural Resources:

Renewable and non-renewable resources: Natural resources and associated problems.

a) Forest resources: Use and Over-exploitation, deforestation, case studies. Dams, benefits and their effects on forests and tribal people.

b) Water resources: Use and over-utilization of surface and ground water, floods, drought, conflicts over water

c) Earth: Geomorphology, Weathering, Structure of Earth - inner core, outer core, mantle and the crust, magma.

d) Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies.

e) Food resources: World food problems, changes caused by agriculture, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies.

- Role of an individual in conservation of natural resources.

- Equitable use of resources for sustainable lifestyles.

UNIT-II:

i) Ecosystems

Concept of an ecosystem, Structure and function of an ecosystem, Producers, consumers and decomposers. Energy flow in the ecosystem, Ecological succession. Food chains, food webs and ecological pyramids.

Types of some ecosystems: -

a. Forest ecosystem b. Desert ecosystem

d. Aquatic ecosystems (ponds, rivers, oceans, estuaries).

ii) Biodiversity and its Conservation

Introduction-Definition: genetic, species and ecosystem diversity. Biogeographical classification of India. Value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values, India as a mega-diversity nation.

Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts. Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity.

UNIT-III:

Environmental Pollution and Disaster management:

Definition - Causes, effects and control measures of:

a. Air pollution b. Water pollution c. Soil pollution d. Marine pollution

e. Noise pollution f. Thermal pollution g. Nuclear hazards

Disaster management: floods, earthquake, cyclone and landslides.
Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust.

UNIT-IV:

Social Issues and the Environment

From Unsustainable to Sustainable development. Water conservation, rain water harvesting, watershed management.

Resettlement and rehabilitation of people; its problems and concerns. Case studies.

Environment Protection Act. Air (Prevention and Control of Pollution) Act. Water (Prevention and Control of Pollution) Act. Wildlife Protection Act. Forest Conservation Act.

Issues involved in enforcement of environmental legislation. Public awareness.

UNIT-V:

i) Human Population and the Environment

Population growth, variation among nations. Population explosion-Family welfare Programme.
Environment and human health, Women and Child Welfare, Role of information Technology in Environment and human health, Case Studies.

ii) Field Work

- Visit to a local area to document environmental assets-river/forest/grassland/ hill/mountain.
- Visit to a local polluted site-Urban/Rural/Industrial/Agricultural.
- Study of simple ecosystems-pond, river, hill slopes, etc.

Text Books:

1. Shashi Chawla, A Text Book of Environmental Studies, Mc Graw Hill Education, 4th edition, 2014

2. De A.K., Environmental Chemistry, Wiley Eastern Ltd , 2012

Reference Books

1. Bharucha Erach, The Biodiversity of India, Mapin Publishing Pvt. Ltd., Ahmedabad -380013, India, Email: mapin@icenet. net (R).

2. Brunner R.C., 1989, Hazardous Waste Incineration, McGraw Hill Inc. 480p.

3. Cunningham, W.P.Cooper, T.H. Gorhani, E & Hepworth, M.T.2001, Environmental Encyclopedia, Jaico Publ. House, Mumbai, 1196p.

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JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

COLLEGE OF ENGINEERING PULIVENDULA(AUTONOMOUS) -PIN: 516390(A.P.)

L	T	P	C
2	0	0	2

UNIVERSAL HUMAN VALUES

OBJECTIVES

- To create an awareness on Engineering Ethics and Human Values.
- To instill Moral and Social Values and Loyalty
- To appreciate the rights of Others

Unit I: HUMAN VALUES

Morals, Values and Ethics-Integrity-Work Ethic-Service learning – Civic Virtue – Respect for others – Living Peacefully – Caring – Sharing – Honesty - Courage- Co Operation – Commitment – Empathy –Self Confidence Character – Self interest - Spirituality, Moral dilemmas- Consensus and controversy.

Unit II: PERSONALITY DEVELOPMENT

Concept of personality, types of personalities, Knowing of self(SWOT), improving personality – techniques, interpersonal skills, intrapersonal skills, building right attitude, developing the spirit of universal human goodness.

Unit III: ENGINEERING AS SOCIAL EXPERIMENTATION AND

Engineering As Social Experimentation – Framing the problem – Determining the facts – Codes of Ethics – Clarifying Concepts – Application issues – Common Ground - General Principles – Utilitarian thinking respect for persons.

RESPONSIBILITY FOR SAFETY AND RISK

Safety and risk – Assessment of safety and risk – Risk benefit analysis and reducing risk- Safety and the Engineer- Designing for the safety.

UNIT IV: UNDERSTANDING HARMONY IN THE FAMILY AND SOCIETY.

Understanding Harmony in the family – the basic unit of human interaction, Understanding the meaning of Vishwas; Difference between intention and competence, Understanding the harmony in the society (society being an extension of family): Samadhan, Samridhi, Abhay, Sah-astitva as comprehensive Human Goals, Visualizing a universal harmonious order in society- Undivided Society (Akhand Samaj), Universal Order (Sarvabhaum Vyawastha)- from family to world family.

UINIT V: GLOBAL ISSUES

Globalization – Cross culture issues- Environmental Ethics – Computer Ethics – Computers as the instrument of Unethical behavior – Computers as the object of Unethical acts – Autonomous Computers- Computer codes of Ethics – Weapons Development - Ethics and Research – Analyzing Ethical Problems in research – Intellectual property Rights(IPR).

Outcomes:

- Identify and analyze an ethical issue in the subject matter under investigation or in a relevant field.
- Identify the multiple ethical interests at stake in a real-world situation or practice.
- Articulate what makes a particular course of action ethically defensible.
- Assess their own ethical values and the social context of problems.
- Identify ethical concerns in research and intellectual contexts, including academic integrity, use and citation of sources, the objective presentation of data, and the treatment of human subjects.
- Demonstrate knowledge of ethical values in non-classroom activities, such as service learning, internships, and field work.
- Integrate, synthesize, and apply knowledge of ethical dilemmas and resolutions in academic settings, including focused and interdisciplinary research.

Text Books

1. "**Engineering Ethics**" by Harris, Pritchard and Rabins, CENGAGE Learning, India Edition, 2009.
2. **Engineering Ethics includes Human Values**" by M.Govindarajan, S.Natarajan and V.S.SenthilKumar-PHI Learning Pvt. Ltd-2009.
3. "**Ethics in Engineering**" by Mike W. Martin and Roland Schinzinger – Tata McGraw-Hill– 2003.
4. "**Professional Ethics and Morals**" by Prof.A.R.Aryasri, Dharanikota Suyodhana-Maruthi Publications.
5. "**Professional Ethics and Human Values**" by A.Alavudeen, R.Kalil Rahman and M.Jayakumaran- Laxmi Publications.
6. "**Indian Culture, Values and Professional Ethics**" by PSR Murthy-BS Publication.

7. **"Professional Ethics and Human Values"** by Prof.D.R.Kiran.

B.Tech III Year I Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

19AHS12-ENGLISH LANGUAGESKILLS

(Common to EEE , ECE & CSE)

L	T	P	C
3	0	0	3

Course Objectives:

- Facilitate active listening to enable inferential learning through expert lectures and talks
- Provide training and opportunities to develop fluency in English through participation in formal group discussions and presentations using audio-visual aids

UNIT – I: **12 Hrs**

Listening: Listening to famous speeches for structure and style
Speaking: Oral presentations on general topics of interest.
Reading: Reading for meaning and pleasure – reading between the lines.
Writing: Appreciating and analyzing a poem –Paraphrasing, note-taking.
Grammar and Vocabulary: Tenses (Advanced Level) Correcting errors in punctuation -Word roots and affixes.
Learning Outcomes:
At the end of this unit, the student will be able to

- Understand the purpose of rhythm and rhyme and the use of figures of speech in making the presentation lively and attractive. **L1**
- Apply the knowledge of structure and style in a presentation, identify the audience and make note of key points. **L2**

UNIT – II: **12 Hrs**

Listening: Following the development of theme; answering questions on key concepts after listening to stories online.
Speaking: Narrating personal experiences and opinions.
Reading: Reading for summarizing and paraphrasing; recognizing the difference between facts and opinions.
Writing: Summarizing, precis writing, letter and note-making
Grammar and Vocabulary: Subject-verb agreement, noun-pronoun agreement, collocations.
Learning Outcomes:

- At the end of this unit, the student will be able to
- Make formal structured presentations on academic topics. **L1**
- Use correct English avoiding common errors in formal speech and writing. **L2**

UNIT – III: **12 Hrs**

Listening: Identifying views and opinions expressed by different speakers while listening to speeches.
Speaking: Small talks on general topics; agreeing and disagreeing, using claims and examples/ evidences for presenting views, opinions and position.
Reading: Identifying claims, evidences, views, opinions and stance/position.
Writing: Writing structured persuasive/argumentative essays on topics of general interest using suitable claims, examples and evidences.
Grammar and Vocabulary: The use of Active and passive Voice, vocabulary for academic texts.
Learning Outcomes:
At the end of this unit, the student will be able to

- Participate in group discussions using appropriate conventions and language. Strategies. **L1**
- Use appropriate vocabulary to express ideas and opinions. **L2**

UNIT – IV **12 Hrs**

Listening: Listening to identify important moments - Understanding inferences; processing of information using specific context clues from the audio.

Speaking: Group discussion; reaching consensus in group work (academic context).

Reading: Reading for inferential comprehension.

Writing: Applying for internship/ job - Writing one's CV/Resume and cover letter.

Grammar and Vocabulary: Phrasal verbs, phrasal prepositions and technical vocabulary.

Learning Outcomes:

At the end of this unit, the student will be able to

- Express thoughts and ideas with acceptable accuracy and fluency **L1**
- Draw inferences and conclusions using prior knowledge and verbal cues **L2**

UNIT – V **12 Hrs**

Listening: Understanding inferences - processing of explicit information presented in the text and implicit information inferable from the text or from previous/background knowledge.

Speaking: Formal team presentations on academic/ general topics.

Reading: Intensive and extensive reading.

Writing: Structure and contents of a Report – Abstract – Project report features.

Grammar and Vocabulary: Correcting common errors, improving vocabulary and avoiding cliches and jargons.

Learning Outcomes:

At the end of this unit, the student will be able to

- Develop advanced listening skills for in-depth understanding of academic texts. **L1**
- Collaborate with a partner to make effective presentations. **L2**

Text Books:

1. "Forging Ahead": A Course Book for B.Tech Students. Orient BlackSwan,2020.
2. Meenakshi Raman &Sangeeta Sharma, "Technical Communication" O U Press2009.

Reference Books:

1. Bailey, Stephen. "Academic writing: A handbook for international students "Routledge, 2014.
2. Chase, Becky Tarver. Pathways: Listening, "Speaking and Critical Thinking". Heinley ELT; 2nd Edition,2018.
3. Skillful Level 2 Reading & Writing Student's Book Pack (B1) Macmillan Educational.
4. Hewings, Martin. "Cambridge Academic English" (B2). CUP, 2012. (Student Book, Teacher Resource Book, CD & DVD).

Course Outcomes:

- At the end of this Course the student will be able to
- Understand the context, topic, and pieces of specific information from social or transactional dialogues spoken by native speakers of English. **L1**
- Apply grammatical structures to formulate sentences and correct word forms **L2**
- Analyze discourse markers to speak clearly on a specific topic in informal discussions. **L3**
- Evaluate reading/listening texts and to write summaries based on global comprehension of the setexts. **L4**
- Create a coherent paragraph interpreting a figure/graph/chart/table. **L5**

B.Tech III Year I Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

19AEC51- ANTENNAS & WAVE PROPAGATION

L	T	P	C
3	0	0	3

Course Objectives: The objectives of the course are to make the students learn about

- To learn the antennas basic terminology, radiation mechanism of antennas and dipole antennas.
- To gain knowledge on few types of antennas, their operation and applications.
- Analyze the working, radiation patterns and applications of microstrip, reflector and lens antennas.
- Understand different techniques involved in the design of antenna arrays and antenna parameter measurements.
- To study the various types of radio wave propagation methods.

UNIT – I: Antenna Basics & Dipole antennas

Definition of antenna, Radiation Mechanism – single wire, two wire, dipoles, Antenna Parameters - Radiation Patterns, Main Lobe and Side Lobes, Beam widths, Beam Area, Radiation Intensity, Beam Efficiency, Directivity, Gain and Resolution, Aperture Efficiency, Effective Height and length, Antenna Theorems. Radiation – Basic Maxwell's equations, Retarded potential-Helmholtz Theorem, Radiation from Small Electric Dipole, Quarter wave Monopole and Half wave Dipole – Current Distributions, Field Components, Radiated power, Radiation Resistance, Beam width, Natural current distributions, far fields and patterns of Thin Linear Center-fed Antennas of different lengths, Illustrative problems.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand antennas basic terminology and radiation mechanism of antennas. **L1**
- Appreciate the working and applications of dipole antennas. **L2**

UNIT – II: VHF, UHF and Microwave Antennas – I

Loop Antennas - Introduction, Small Loop, Comparison of far fields of small loop and short dipole, Radiation Resistances and Directives of small and large loops (Qualitative Treatment), Arrays with Parasitic Elements - Yagi - Uda Arrays, Folded Dipoles & their characteristics. Helical Antennas- Helical Geometry, Helix modes, Practical Design considerations for Monofilar Helical Antenna in Axial and Normal Modes. Horn Antennas- Types, Fermat's Principle, Optimum Horns, Design considerations of Pyramidal Horns, Illustrative Problems.

Learning Outcomes:

At the end of this unit, the student will be able to

- Gain knowledge on the working and applications of Loop antennas. **L1**
- Understand the working and uses of Yagi-Uda, Helical and Horn antennas **L2**

UNIT – III: VHF, UHF and Microwave Antennas – II

Micro strip Antennas- Introduction, features, advantages and limitations, Rectangular patch antennas- Geometry and parameters, characteristics of Micro strip antennas, Impact of different parameters on characteristics, reflector antennas - Introduction, Flat sheet and corner reflectors, parabola reflectors- geometry, pattern characteristics, Feed Methods, Reflector Types - Related Features, Lens Antennas - Geometry of Non-metallic Dielectric Lenses, Zoning , Tolerances, Applications, Illustrative Problems.

Learning Outcomes:

At the end of this unit, the student will be able to

- Design the Micro strip Antennas and analyze their performance. **L6**
- Analyze the workingand applications of reflector and lens antennas. **L4**

UNIT – IV: Antenna Arrays

Point sources - Definition, Patterns, arrays of 2 Isotropic sources- Different cases, Principle of Pattern Multiplication, Uniform Linear Arrays – Broadside Arrays, Endfire Arrays, EFA with Increased Directivity, Derivation of their characteristics and comparison, BSAa with Non-uniform Amplitude Distributions - General considerations and Bionomial Arrays, Illustrative problems.

Antenna Measurements

Introduction, Concepts- Reciprocity, Near and Far Fields, Coordination system, sources of errors, Patterns to be Measured, Pattern Measurement Arrangement, Directivity Measurement , Gain Measurements (by comparison, Absolute and 3-Antenna Methods).

Learning Outcomes:

At the end of this unit, the student will be able to

- Design the antenna arrays based on the application. **L6**
- Apply different techniques to measure antenna parameters. **L3**

UNIT – V: Wave Propagation

Introduction, Definitions, Characterizations and general classifications, different modes of wave propagation, Ray/Mode concepts, Ground wave propagation (Qualitative treatment) - Introduction, Plane earth reflections, Space and surface waves, wave tilt, curved earth reflections, Space wave propagation - Introduction, field strength variation with distance and height, effect of earth's curvature, absorption, Super refraction, M-curves and duct propagation, scattering phenomena, tropospheric propagation, fading and path loss calculations, Sky wave propagation - Introduction, structure of Ionosphere, refraction and reflection of sky waves by Ionosphere, Ray path, Critical frequency, MUF, LUF, OF, Virtual height and Skip distance, Relation between MUF and Skip distance, Multi-HOP propagation, Energy loss in Ionosphere, Summary of Wave Characteristics in different frequency ranges, Illustrative problems.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand the various types of radio wave propagation methods. **L2**
- Identify the type of wave propagation method required based on the type of antenna and application. **L1**

Text Books:

1. John D. Kraus
2. C.A. Balanis

Reference Books:

1. E.C. Jordan and K.G. Balmain
2. G.S.N Raju
3. K.D. Prasad and Satya Prakashan

Course Outcomes:

At the end of this Course the student will be able to

- Understand the antennas basic terminology and radiation mechanism of antennas. **L2**
- Gain knowledge on few types of antennas, their operation and applications. **L1**
- Design and analyze the working and applications of microstrip, reflector and lens antennas. **L6**
- Analyze different techniques involved in the design of antenna arrays and antenna parameter measurements. **L4**
- Gain a comprehensive knowledge about the types of radio wave propagation methods. **L1**

B.Tech III Year I Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

19AEC52- DIGITAL COMMUNICATIONS

L	T	P	C
3	0	0	3

Course Objectives: The objectives of the course are to make the students learn about

- To know about sampling, quantization and various source coding techniques.
- To understand the concepts of baseband pulse transmission.
- To analyze representation, conversion and detection of signal space diagram.
- To gain knowledge about various digital modulation techniques and their error probabilities.
- To get familiar with channel coding techniques and multiple access techniques.

UNIT – I: Source Coding Systems

Introduction to digital communications, sampling process, quantization, Pulse-Code Modulation (PCM), Quantization Process, Noise considerations in PCM systems, Line codes, Time-Division Multiplexing (TDM), Delta modulation, Differential pulse-code modulation, Adaptive Differential pulse-code modulation , Comparison of the above systems.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand basic sampling and quantization techniques. **L2**
- Gain knowledge about various source coding techniques. **L1**

UNIT – II: Baseband Pulse Transmission

Introduction, Matched filter , Properties of Matched filter, Matched filter for Rectangular pulse, Error rate due to noise, Inter-symbol Interference (ISI) , Nyquist criterion for distortion less baseband binary transmission, ideal Nyquist channel, Raised cosine filter & its spectrum, Correlative coding – Duo binary & Modified duo binary signaling schemes, Baseband M-array PAM transmission, Eye diagram.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand the basic principles of baseband and passband digital modulation schemes. **L2**
- Analyze the performance of Matched filter and its properties. **L4**

UNIT – III: Signal Space Analysis

Introduction, Geometric representation of signals, Gram-Schmidtorthogonalization procedure, Conversion of the Continuous AWGN channel into a vector channel, Coherent detection of signals in noise, Correlation receiver, Equivalence of correlation and Matched filter receivers, Probability of error, Signal constellation diagram.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand the representation and conversion of signals. **L2**
- Analyze the detection of signal space diagram. **L4**

UNIT – IV: Digital Modulation Techniques

Introduction, Pass Band Transmission Model,Method of generation and detection of coherent Binary ASK, FSK & PSK,Differential phase shift keying, Quadrature modulation techniques (QAM, QPSK and MSK), M-array PSK, M-array QAM, Comparison of bandwidth requirements and probability of bit error for the above schemes.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand the performance of various digital modulation techniques. **L2**
- Determine the probability of error for various digital modulation schemes. **L3**

UNIT – V: Channel Coding

Error Detection & Correction - Repetition & Parity Check Codes, Code Vectors and Hamming Distance, Forward Error Correction (FEC) Systems, Automatic Retransmission Query (ARQ) Systems, Linear Block Codes – Matrix Representation of Block Codes, Syndrome Decoding, Convolutional Codes – Convolution Encoding, Decoding Methods.

Introduction of Multiple Access Techniques

Frequency Division Multiple Access, Time Division Multiple Access, Code Division Multiple Access.

Learning Outcomes:

At the end of this unit, the student will be able to

- Describe various error control codes. **L1**
- Understand and appreciate various Multiple Access Techniques. **L2**

Text Books:

1. Simon Haykin
2. Bernard Sklar
3. T. S. Rappaport

Reference Books:

1. J. G. Proakis, M Salehi and Gerhard Bauch, "Digital Communications", 5th Edition, McGraw-Hill Education private limited 2008.
2. A. Bruce Carlson and Paul B. Crilly, "Communication Systems – An Introduction to Signals & Noise in Electrical Communication", 4th Edition, McGraw-Hill International Edition, 2002.

Course Outcomes:

At the end of this Course the student will be able to

- Understand the concepts of sampling, quantization and various coding techniques. **L2**
- Summarize the concepts of baseband pulse transmission. **L2**
- Analyze representation, conversion and detection of signal space diagram. **L4**
- Compare various digital modulation techniques and their error probabilities. **L2**
- Understand channel coding techniques and multiple access techniques. **L2**

B.Tech III Year I Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

19AEC53- COMPUTER ARCHITECTURE AND ORGANIZATION

L	T	P	C
3	1	0	4

Course Objectives: The objectives of the course are to make the students learn about

- To impart basic concepts of computer architecture and organization.
- To understand the design of the various functional units and micro operations of digital computers.
- To analyze micro programming and arithmetic operations.
- To gain knowledge about interfacing of input output devices and memory organization.
- To learn the basics of Parallel Computing and Pipelining.

UNIT – I: Basic Structure of Computers

Computer types, Functional units, basic operational concepts, Bus structures, Data types, Software: Languages and Translators, Loaders, Linkers, Operating systems.

Addressing Methods and Machine Program Sequencing

Memory locations – addresses and encoding of information – main memory operations – Instruction formats and instruction sequences – Addressing modes and instructions – Simple input programming – pushdown stacks – subroutines.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand various components of computer and their interconnections. **L2**
- Learn different addressing methods and machine program sequencing. **L1**

UNIT – II: Register Transfer and Micro Operations

Register transfer Language, Register transfer, Bus and Memory Transfers, Arithmetic Micro operations, Logic Micro operations, shift Micro operations, Arithmetic Logic Shift Unit

Central Processing Unit

Stack organization, instruction formats, Addressing modes, Data transfer and manipulation, Execution of a complete instruction, Sequencing of control signals, Program Control.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand the Register Transfer and Micro Operations in computer organization. **L2**
- Learn different types of instruction formats and program control unit. **L1**

UNIT – III: Micro-Programmed Control

Control Memory, Address Sequencing, Micro Program Example, Design of Control Unit.

Computer Arithmetic

Addition and Subtraction, Multiplication Algorithms, Division Algorithms, Floating Point Arithmetic Operations, Decimal Arithmetic Unit, Decimal Arithmetic Operations.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand Micro-programmed control unit. **L1**
- Learn the implementation of Computer Arithmetic operations. **L2**

UNIT – IV: Input-Output Organization

Peripheral Devices, Input-Output Interface, Asynchronous Data Transfer, Modes of Transfer, Priority Interrupt, Direct Memory Access (DMA), Input-Output Processor (IOP), Serial Communication.

Memory Organization

Memory hierarchy, main memory, auxiliary memory, Associative memory, Cache memory, Virtual memory, Memory management hardware.

Learning Outcomes:

At the end of this unit, the student will be able to

- Gain knowledge on interfacing of Input-Output devices and data transfer between them. **L1**
- Understand memory organization in different types of memory and memory management hardware. **L2**

UNIT – V: Pipeline and Vector Processing

Parallel Processing, Pipelining, Arithmetic Pipeline, Instruction Pipeline, RISC Pipeline Vector Processing, Array Processors.

Multi-Processors

Characteristics of Multiprocessors, Interconnection Structures, Inter processor Arbitration, Inter-processor Communication and Synchronization, Cache Coherence.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand parallel processing, pipelining and vector processing. **L2**
- Gain knowledge on basic Multi-Processors and their characteristics. **L1**

Text Books:

1. M. Morris Mano
2. William Stallings

Reference Books:

1. Carl Hamacher, ZvonksVranesic andSafwatZaky, "Computer Organization",5th Edition, McGraw Hill, 2002.
2. Andrew S.Tanenbaum, "Structured Computer Organization", 4th Edition PHI/Pearson

Course Outcomes:

At the end of this Course the student will be able to

- Understand the basic concepts of computer architecture and organization. **L2**
- Gain knowledge about various functional units and micro operations of digital computers. **L1**
- Describe micro programming and arithmetic operations. **L1**
- Understand the concept of memory organization and Interfacing input output devices. **L2**
- Learn the basics of Parallel Computing and Pipelining. **L1**

B.Tech III Year I Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

19AEC54a- INFORMATION THEORY AND CODING

(Professional Elective-I)

L	T	P	C
3	0	0	3

Course Objectives: The objectives of the course are to make the students learn about

- To analyze the concepts of source coding and channel models.
- To analyze different types of error correcting codes.
- To understand the concepts of coded modulation and TCM Design rules
- To gain knowledge on Cryptography, Encryption techniques and Algorithms.
- To learn Pseudo noise sequence and Spread Spectrum techniques.

UNIT – I: Source Coding

Introduction to information theory, Uncertainty and information, Average mutual information and entropy, information measures for continuous random variables, source coding theorem, the Lempel-Ziv algorithm, run length coding and PCX format, rate distortion function, introduction to image compression.

Channel Models And Coding

Introduction, Channel models, channel capacity, channel coding, information capacity theorem, channel capacity for MIMO systems, Random selection of codes

Learning Outcomes:

At the end of this unit, the student will be able to

- Gain knowledge on source coding techniques. **L1**
- Understand the channel models and channel capacity measurements. **L2**

UNIT – II: Error Control Coding

Introduction to Error Correcting Codes, Basic Definitions, Equivalent Codes, Perfect Codes, Low Density Parity Check(LDPC)Codes, Optimal Linear Codes, Maximum Distance Separable(MDS)Codes, Bound son Minimum Distance, Space Time Block Codes .

Learning Outcomes:

At the end of this unit, the student will be able to

- Compare different error control coding techniques. **L2**
- Understand how to find errors in the transmitted data . **L2**

UNIT – III: Trellis Coded Modulation

Introduction to TCM, Concept of Coded Modulation, Mapping by Set Partitioning, Unger boeck's TCM Design Rules, TCM Decoder, Performance Evaluation for AWGN Channel, Computation ofd free, Space Time Trellis Codes.

Learning Outcomes:

At the end of this unit, the student will be able to

- Apply the knowledge gained on trellis coded modulation **L3**
- Understand the TCM design rulesand space time trellis codes **L2**

UNIT – IV: Coding For Secure Communications

Introduction to Cryptography, An Overview of Encryption Techniques, Operations Used by Encryption Algorithms, Symmetric(Secrete Key) Cryptography, Data Encryption Standard(DES), International Data Encryption Algorithm(IDEA), RC Ciphers, Asymmetric(Public-Key)Algorithms, The RSA Algorithm, Quantum Cryptography, Biometric Encryption, Cryptanalysis.

Learning Outcomes:

At the end of this unit, the student will be able to

- Gain knowledge on importance of secure communications. **L1**
- Analyze different types of encryption and cryptanalysis techniques. **L4**

UNIT – V: Spread Spectrum Modulation

Pseudo noise sequence, properties of maximum length sequence, principle of Direct Sequence Spread Spectrum (DSSS), DSSS with coherent binary phase shift keying, frequency hop spread spectrum, fast frequency hopping and its applications.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand pseudo noise sequence and its properties. **L2**
- Gain knowledge on spread spectrum modulation techniques. **L1**

Text Books:

1. R Bose, "Information Theory, Coding and Cryptography", TMH 2007
2. K N Hari Bhat and D Ganesh Rao,"Digital Communications", Pearson, 3E, 2010

Reference Books:

1. H. Taub and D. Schilling, "Principles of Communication Systems", TMH, 2003
2. John Proakis, "Digital Communications", TMH, 1983.
3. Singh and Sapre, "Communication Systems Analog & Digital", TMH, 2004.

Course Outcomes:

At the end of this Course the student will be able to

- Grasp the concepts of source coding and channel models. **L1**
- Understand different types of error correcting codes. **L2**
- Apply the concepts of code demodulation and TCM Design Rules **L3**
- Understand Cryptography, Encryption techniques and Algorithms. **L2**
- Explain Pseudo noise sequence and Spread Spectrum techniques. **L1**

B.Tech III Year I Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

19AEC54b- INDUSTRIAL ELECTRONICS

(Professional Elective-I)

L	T	P	C
3	0	0	3

Course Objectives: The objectives of the course are to make the students learn about

- To learn the construction, working and applications of power transistors and thyristors.
- To gain knowledge about Power MOSFETs and different types of protection circuits.
- To study the operation of Rectifiers, Inverters, Relays and Timers.
- To know about the industrial applications of electronics in welding and heating.
- To understand the industrial applications of Ultrasonics.

UNIT – I: Power Bipolar Junction Transistors and Thyristor Power Devices **10 Hrs**

Introduction, Transistor Structures, Current-Voltage Characteristics, Second Breakdown, Safe Operating Area (SOA), Fabrication of Power Transistors, Power derating, Polarized Snubber.

Thyristor Structure, Thyristor Turn-on and Turn-off Methods, Thyristor Ratings, SCR Applications, Light Activated Silicon Controlled Rectifier (LASCR), Shockley Diode, Diac and Triac, Uni Junction Transistor(UJT), UJT Relaxation Oscillator, Full Wave Phase Control Circuit, Programmable UJT(PUT) Complementary UJT (CUJT), The Silicon Controlled Switch (SCS), Gate Turn Off Thyristors (GTO), Gate Drive Circuits.

Learning Outcomes:

At the end of this unit, the student will be able to

- Gain knowledge on working of power transistors and thyristors. **L1**
- Understand the industrial applications of power transistors and thyristors. **L2**

UNIT – II: Power Switching Devices and Protection Circuits **10 Hrs**

Power MOSFETs, Power Semiconductor Switches, Power Semiconductor Materials, Power Integrated Chips (PIC).

Power MOSFETs, Power Semiconductor Switches, Power Integrated Chips (PIC), Cooling & Heat Sinks Protection of Semiconductor Devices, Gate Protection Circuits, Gate Drive Circuits, Protection of Power Transistors, Series and Parallel Connection of Thyristors.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand the working of Power MOSFETs, Switches & Integrated Chips.(L2) **L2**
- Know the importance of Heat Sinks & Protection circuits.(L1) **L1**

UNIT – III: Rectifiers And Inverters **10 Hrs**

Flywheel Diode, Half-Wave Rectifier Circuit with Inductive Load, Single Phase Full Wave Rectifier Circuit with RL Load, Poly Phase Rectifiers, Three Phase Rectifier with Delta-Star Connected Transformer, Six Phase Half-Wave Rectifier, Controlled Poly Phase Rectifiers, Effect of Inductance, Voltage Multiplier Circuit Inverters, Thyristorized Inverters, Series Type Inverter, Modified Series Inverter, McMURRAY-BEDFORD Inverter Bridge.

Relays And Timers

Basic Construction of Relays, AC relays, RC Charging & Discharging Circuits, UJT/SCR, AC & Precision Long Time Delay Relays, Integrated Circuit Timers, Synchronous Timer, Sequence Timer Employing 555.

Learning Outcomes:

At the end of this unit, the student will be able to

- Explain the working of multiphase rectifiers and inverters. **L2**
- Know the industrial applications of relays and timers. **L1**

UNIT – IV: INDUSTRIAL APPLICATIONS – I **10 Hrs**

Resistance Welding Controls: Introduction, Resistance welding process, Basic Circuit for A.C. resistance welding, Types of Resistance welding, electronic welding control used in Resistance welding, Energy storage welding.

Induction Heating: Principle of induction heating, Theory of Induction heating merits of induction heating Application of induction heating, High frequency power source of induction heating.

Dielectric Heating: Principle of dielectric heating, theory of dielectric heating, dielectric properties of typical materials, electrodes used in dielectric heating, method of coupling of electrodes to the R.F. generator, Thermal losses in Dielectric heating, Applications.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand different types of resistance welding processes and controls. **L2**
- Appreciate the industrial applications of induction heating & dielectric heating. **L1**

UNIT – V: INDUSTRIAL APPLICATIONS – II **10 Hrs**

Ultrasonics: Introduction, Generation of Ultrasonic waves, Application of Ultrasonic waves, Ultrasonic stroboscope, ultrasonic as means of communication, ultrasonic flaw detection, Optical image on non-homogeneities, ultrasonic study of structure of matter, Dispersive study of structure of matter, Dispersive and colloidal effect of Ultrasonic, Coagulating action of Ultrasonic, separation of mixtures by ultrasonic waves cutting and machining of hard materials by ultrasonic vibrations, Degassing of liquids by ultrasonic waves Physico-chemical effects of ultrasonics, chemical effects of ultrasonics, Thermal effects of Ultrasonics soldering and welding by ultrasonics, Ultrasonic Drying.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand the generation &applications of Ultrasonics. **L2**
- Learn the chemical and thermal effects of Ultrasonics. **L1**

Text Books:

1. G. K. Mithal, "Industrial Electronics", Khanna Publishers, 2000.
2. J .Gnanavadivel, R.Dhanasekaran and P.Maruthupandi, "Industrial Electronics", Anuradha Publications, 2011.
3. S. N Biswas, "Industrial Electronics", Dhanpat Rai & Co.

Reference Books:

1. M. Rammurthy, "Thyristors and Applications", East-West Press, 1977.
2. F. D. Petruzulla, "Industrial Electronics", McGraw Hill, Singapore, 1996.
3. M. H. Rashid, "Power Electronics Circuits, Devices and Application",3rd Ed., PHI, 2004.

Course Outcomes:

At the end of this Course the student will be able to

- Understand the construction, working and applications of power transistors and thyristors. **L2**
- Know about Power MOSFETs and different types of protection circuits. **L1**
- Appreciate the working of Rectifiers, Inverters, Relays and Timers. **L1**
- Know the industrial applications of electronics in welding and heating. **L1**
- Understand the industrial applications of Ultrasonics. **L2**

B.Tech III Year I Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

19AEC54c- ARTIFICIAL INTELLIGENCE AND NEURAL NETWORKS

(Professional Elective-I)

L	T	P	C
3	0	0	3

Course Objectives: The objectives of the course are to make the students learn about

- To learn the differences between structure of agents & problem solving agents.
- To solve problems with uniformed search strategies & Heuristic search.
- To be able to solve Inference in first order logic.
- To understand the development of Neural Networks with basic principles.
- To acquire knowledge on Feed forward &Feedback Neural Networks.

UNIT – I:

Introduction: AI problems, foundation of AI and history of AI intelligent agents: Agents and Environments, the concept of rationality, the nature of environments, structure of agents, problem solving agents, problem formulation.

Learning Outcomes:

At the end of this unit, the student will be able to

- Gain knowledge on basics and problems of Artificial Intelligence. **L1**
- Analyze the concept of rationality and structure of problem solving agents. **L4**

UNIT – II:

Searching: Searching for solutions, uniformed search strategies – Breadth first search, depth first Search. Search with partial information (Heuristic search), Knowledge Representation & Reasons logical Agents, Knowledge – Based Agents, the Wumpus world, logic, propositional logic, reasoning patterns in propositional logic, Resolution, Forward & Backward Chaining.

Learning Outcomes:

At the end of this unit, the student will be able to

- Know how to search for solutions using knowledge based agents. **L1**
- Analyze reasoning patterns in propositional logic, Forward and Backward Chaining. **L4**

UNIT – III:

First Order Logic : Inference in first order logic, propositional Vs. first order inference, unification & lifting forward chaining, Backward chaining, Resolution.

Learning Outcomes:

At the end of this unit, the student will be able to

- Gain knowledge on Inference concept present in first order logic. **L1**
- Analyze the differences between propositional & first order inference. **L4**

UNIT – IV:

Characteristics Of Neural Networks :Historical Development of Neural Networks Principles, Artificial Neural Networks: Terminology, Models of Neuron, Topology, Basic Learning Laws, Pattern Recognition Problem, Basic Functional Units, Pattern Recognition Tasks by the Functional Units.

Learning Outcomes:

At the end of this unit, the student will be able to

- Articulate the structure of Artificial Neural Networks with working principles.(L3) **L1**
- Identify the importance of models of Neuron, topology &basic learning laws.(L1) **L2**

UNIT – V: **10 Hrs**

Feedforward Neural Networks: Introduction, Analysis of pattern Association Networks, Analysis of Pattern Classification Networks, Analysis of Pattern Mapping Networks.

Feedback Neural Networks:

Introduction, Analysis of Linear Auto associative FF Networks, Analysis of Pattern Storage Networks.

Learning Outcomes:

At the end of this unit, the student will be able to

- Differentiate Feed forward Neural Networks& Feedback Neural Networks.(L4) **L1**
- Analyze the Pattern Association, Classification & Mapping Networks.(L4) **L2**

Text Books:

1. Stuart Russel and Peter Norvig, "Artificial Intelligence – A Modern Approach", Second Edition, PHI/ Pearson Education.2009.
2. B. Yagna Narayana, "Artificial Neural Networks", PHI, 2006.

Reference Books:

1. E.Rich and K.Knight, "Artificial Intelligence", 2nd Edition, Tata Mc Graw Hill,
2. Simon Haykin, "Neural Networks", PHI, 2009

Course Outcomes:

At the end of this Course the student will be able to

- Contrast the differences between structure of agents & problem solving agents. **L4**
- Solve problems with uniformed search strategies & Heuristic search. **L3**
- Analyze the problems of inference in first order logic. **L4**
- Understand the development of Neural Networks with basic principles. **L2**
- Acquire knowledge on Feed forward &Feedback Neural Networks. **L1**

B.Tech III Year I semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

19AHS10-CAMPUS RECRUITMENT TRAINING & SOFT SKILLS

(Open Elective-I)

L	T	P	C
3	0	0	3

Course Objectives:

- To prepare to face global competition for employment and excellence in profession.
- To help the students understand and build interpersonal and interpersonal skills that will enable them to lead meaningful professional life.

UNIT – 1: SOFT SKILLS: INTRODUCTIUON

Soft Skills: Definition-Meaning--Importance- Why skill gap -Analysis—Personality Developments. Soft Skills- Learning Methods.

Learning Outcomes:

At the end of this unit, the student will be able to

- Developing self-motivation, raised aspirations and belief in one's own abilities, defining and committing to achieving one's goals. **L1**
- Learning to keep going when things don't go according to plan, coping with the unfamiliar, managing disappointment and dealing with conflict **L2**

UNIT – II: PERSONAL SKILLS

Intra-Personal: Definition-Meaning-Importance-SWOT analysis- Goal Setting- Emotional Intelligence- Right thinking- Problem Solving-Time management.

Inter-Personal: Definition-Meaning-Importance-Communications skills- Team Work-Negotiation Skills-Leadership skills.

Learning Outcomes:

At the end of this unit, the student will be able to

- A commitment to ethics and integrity in academic and professional relationships, within the community and the environment. **L1**
- Describe how good communication with other can influence our working relationships **L2**

UNIT – III:VERBAL AND NON VERBAL SKILLS

Verbal Skills: Definition and Meaning-Importance-Improving Tips for Listening, Speaking, Reading-Writing Skills.

Non Verbal Skills: Definition and Meaning-Importance- Dress Code- Facial Expressions- Eye Contact- Proxemics - Haptics-Posture-Kinetics- Para Language.

Learning Outcomes:

At the end of this unit, the student will be able to

- Compares verbal and nonverbal communication **L1**
- Understand the functions of nonverbal communication **L2**

UNIT – IV: FINISHING SCHOOL

Before Interview: Bridging between Campus and Corporate-Preparation of Resume-Cover Letter-Statement of Purpose-E-mail writing-Corporate Etiquettes.

Learning Outcomes:

At the end of this unit, the student will be able to

- Learner will be able to prepare his/ her own Resume and Cover letter. **L1**
- Learner will understand the importance of etiquettes and learn the nuances of expected behaviour within a group, a social class and society at general **L2**

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UNIT – V: DURING INTERVIEW

Interview Skills: Importance-Purpose- Types of interviews –Preparation for interviews - Top Questions- Body Language in Interview Room-Do's and Don't s of interview.

Learning Outcomes:

At the end of this unit, the student will be able to

- Learner will be able to face interview questions and effectively present his /her. skills **L1**
- Learner will manage how to plan and organize personal and professional life. **L2**

Reference Books:

1. Sherfield, M. Robert at al **CornerstoneDeveloping Soft Skills**, 4th ed. Pearson Publication,New Delhi, 2014.
2. Alka Wadkar, **Life Skills for Success,** Sage Publications India Private Limited; First edition (1 May 2016)
3. Sambaiah.M. **Technical English**, Wiley publishers India. New Delhi. 2014.
4. GANGADHAR JOSHI, **From Campus to Corporate**, SAGE TEXT.
5. Alex.K, **Soft Skills,** 3rd ed. S. Chand Publication, New Delhi, 2014.
6. Meenakshi Raman and Sangita Sharma, **Technical Communication: Principle and Practice**, Oxford University Press. 2009.
7. Shalini Varma, **Body Language for Your Success Mantra,** 4th ed, S. Chand Publication, New Delhi, 2014.
8. Stephen Covey, **Seven Habits of Highly Effective People**, JMD Book, 2013.

Course Outcomes:

At the end of this Course the student will be able to

- The students will be able to assimilate and understood the meaning and importance of soft skills and learn how to develop them. **L1**
- The students will understand the significance of soft skills in the working environment for professional excellence. **L2**
- The students will be prepared to undergo the placement process with confidence and clarity. **L3**
- The students will be ready to face any situation in life and equip themselves to handle them effectively. **L4**
- The students will understand and learn the importance of etiquettes in both professional and personal life **L5**

B.Tech III Year I Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

19ABS20-MATHEMATICAL MODELING

(Open Elective -I)

L	T	P	C
3	0	0	3

Course Objectives:

- To provide the basic knowledge to understand a Mathematical model.
- To formulate a Mathematical model related to a real world problems of engineering, biological science etc.

UNIT – 1: Mathematical Modeling & Mathematical modeling Through Ordinary differential equations of First Order : **9 Hrs**

Mathematical Modeling : Need, Techniques, Classifications and Simple illustrations,

Mathematical modeling Through Ordinary differential equations of First Order :

Mathematical modeling Through differential equations; Linear growth and decay models; Non-Linear Growth and Decay models; Mathematical modeling in dynamics through ordinary differential equations of first order.

Learning Outcomes:

At the end of this unit, the student will be able to

- Learn various mathematical techniques in modeling a problem. **L2**
- Learn modeling in dynamics through ordinary differential equations of first order. **L3**

UNIT – II: Mathematical modeling Through System of Ordinary differential equations of First Order:

Mathematical modeling in population dynamics; Mathematical modeling of Epidemics through system of ordinary differential equations of first order; Compartment models through Systems of ordinary differential equations; Mathematical modeling in dynamics through systems of ordinary differential equations of first order.

Learning Outcomes:

At the end of this unit, the student will be able to

- Develop a modeling of Epidemics through system of ordinary differential equations of first order. **L4**
- Analyze a modeling in dynamics through systems of ordinary differential equations of first order. **L3**

UNIT – III: Mathematical modeling Through Ordinary differential equations of Second Order:

Mathematical modeling of Planetary motion; Mathematical modeling of Circular motion and motion of satellites; Mathematical modeling through linear differential equations of second order.

Learning Outcomes:

At the end of this unit, the student will be able to

- Evaluate a mathematical modeling of planetary motion. **L5**
- Analyze a mathematical modeling of Circular motion and motion of satellites **L3**

UNIT – IV: Mathematical modeling Through Difference equations :

Need for Mathematical modeling Through Difference equations and simple models; Basic theory of Linear difference equations with constant coefficients; Mathematical modeling Through Difference equations in population dynamics and genetics; Mathematical modeling Through Difference equations in Probability theory.

Learning Outcomes:

At the end of this unit, the student will be able to

- Analyze mathematical modeling through difference equations in population dynamics and genetics. **L4**
- Analyze mathematical modeling through difference equations in probability theory. **L4**

UNIT – V: Mathematical modeling Through Functional, Integral, Delay- Differential and Differential-Difference Equations :

Mathematical modeling Through Functional equations; Mathematical modeling Through Integral equations; Mathematical modeling Through Delay- Differential and Differential-Difference Equations.

Learning Outcomes:

At the end of this unit, the student will be able to

- Analyze a mathematical modeling through functional equations and integral equations. **L4**
- Analyze a mathematical modeling Through Delay- Differential and Differential-Difference Equations **L4**

Text Books:

1. J. N. Kapoor. Mathematical Modeling , New Age International Publishers.

Reference Books:

1. A. C. Fowler. Mathematical Models in Applied Sciences, Cambridge University Press.

Course Outcomes:

At the end of this Course the student will be able to

- Understand the basic concepts in mathematical modeling. **L1**
- Have better insight of the real word problems through mathematical modeling. **L2**
- Apply various concepts of mathematics in modeling. **L3**
- Analyze the real word problems through the techniques of modeling. **L4**
- Evaluate the real word problems through mathematical modeling. **L5**

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B.Tech III year I Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

19ABS21-FUZZY SET THEORY, ARITHMETIC AND LOGIC

(Open Elective -I)

L	T	P	C
3	0	0	3

Course Objectives: This course aims at providing

- the basic knowledge to understand Fuzzy set theory and Arithmetic. and
- Logic, related to a real word problems of engineering, Science etc.

UNIT – I: Classical (Crisp) Sets To Fuzzy Sets & Fuzzy Sets Versus Crisp Sets **9 Hrs**

Classical (Crisp) Sets To Fuzzy Sets:

Introduction: Crisp Sets: An Overview, Fuzzy Sets: Basic Types, Fuzzy Sets: Basic Concepts, Characteristics and Significance of the Paradigm Shift.

Fuzzy Sets Versus Crisp Sets:

Alpha -Cuts :Additional Properties of alpha -Cuts, Representations of Fuzzy Sets, Extension Principle for Fuzzy Sets

Learning Outcomes:

At the end of this unit, the student will be able to

- The basic concepts of Sets and Fuzzy sets **L2**
- Analyze the Fuzzy Sets Versus Crisp Sets **L3**

UNIT – II: Operations On Fuzzy Sets:

Types of Operations, Fuzzy Complements, Fuzzy Intersections: t-Norms Fuzzy Unions: t- Conorms, Combinations of Operations, Aggregation Operations.

Learning Outcomes:

At the end of this unit, the student will be able to

- Do some operations on Fuzzy sets **L2**
- Assess t-Norms Fuzzy Unions **L3**

UNIT – III: Fuzzy Arithmetic & Fuzzy Relations:

Fuzzy Arithmetic :

Fuzzy Numbers, Linguistic Variables, Arithmetic Operations on Intervals, Arithmetic Operations on Fuzzy Numbers, Lattice of Fuzzy Numbers, Fuzzy Equations.

Fuzzy Relations:

Crisp versus Fuzzy Relations, Projections and Cylindric Extensions, Binary Fuzzy Relations, Binary Relations on a Single Set, Fuzzy Equivalence Relations, Fuzzy Compatibility Relations, Fuzzy Ordering Relations.

Learning Outcomes:

At the end of this unit, the student will be able to

- Perform arithmetic operations on Fuzzy numbers and equations. **L2**
- Analyze Fuzzy Relations, Projections and Cylindric Extensions etc. **L3**

UNIT – IV: Fuzzy Relation Equations & Possibility Theory

Fuzzy Relation Equations:

General Discussion ,Problem Partitioning , Solution Method , Fuzzy Relation Equations Based on Sup-i Compositions , Fuzzy Relation Equations Based on Inf- ω_i Compositions

Possibility Theory:

Fuzzy Measures, Evidence Theory, Possibility Theory, Fuzzy Sets and Possibility Theory, Possibility Theory versus Probability Theory.

Learning Outcomes:

At the end of this unit, the student will be able to

- Solve Fuzzy relation equations. L3
- Analyze Possibility Theory L4

UNIT – V: Fuzzy logic

Classical Logic: An Overview, Multivalued Logics, Fuzzy Propositions, Fuzzy Quantifiers, Linguistic Hedges, Inference from Conditional Fuzzy Propositions, Inference from Conditional and Qualified Propositions, Inference from Quantified Propositions.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand the Fuzzy logic. **L1**
- Analyze the Inferences from Conditional, Qualified, and Quantified Propositions. **L4**

Text Books:

1. Fuzzy Sets and Fuzzy Logic, Geoge J. Klir and Bo Yuan

Reference Books:

1. Fuzzy Mathematical Models in Engineering and Management Science, A. Kaufmann and M.M. Gupta
2. Fuzzy Logic, Timothy J. Ross
3. Fuzzy Set Theory, H.J. Zimmermann
4. Introduction to Fuzzy Logic and Fuzzy Sets, J.J. Buckley and E. Eslami

Course Outcomes:

At the end of this Course the student will be able to

- Understand the basic concepts of Fuzzy sets and logic. **L1**
- Do some operations of Fuzzy sets. **L2**
- Solve Fuzzy relation equations. **L3**
- Analyze the Inferences from Conditional, Qualified, and Quantified Propositions. **L4**
- Analyze the real word problem through the technique of Fuzzy set theory and logic to have better insight of the real word problems. **L5**

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B.Tech III Year I Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

19ABS22-NUMBER THEORY

(Open Elective -I)

L	T	P	C
3	0	0	3

Course Objectives: This course aims at providing the basic knowledge

- To understand basic concepts of Number theory and
- To analyze the applications of Riemann Zeta Function and Dirichlet L Function of Number theory related to real word problems of engineering, biological science etc.

UNIT – 1: Divisibility and Primes & Congruences **9 Hrs**

Divisibility and Primes:

Division algorithm, Euclid's algorithm for the greatest common divisor- Linear Diophantine equations - Prime numbers, fundamental theorem of arithmetic, infinitude of primes- Distribution of primes, twin primes, Goldbach conjecture - Fermat and Mersenne primes - Primality testing and factorization.

Congruences:

Modular arithmetic- Linear congruences- Simultaneous linear congruences, Chinese Remainder Theorem- An extension of Chinese Remainder Theorem (with non-coprime moduli).

Learning Outcomes:

At the end of this unit, the student will be able to

- Learn Division algorithm, Euclid's algorithm etc. **L2**
- Analyze linear congruences- Simultaneous linear congruences, and Chinese Remainder Theorem. **L3**

UNIT – II: Congruences with a Prime-Power Modulus, Euler's Function and RSA Cryptosystem, and Units Modulo an Integer

Congruences with a Prime-Power Modulus:

Arithmetic modulo p, Fermat's little theorem, Wilson's theorem - Pseudo-primes and Carmichael numbers- Solving congruences modulo prime powers.

Euler's Function and RSA Cryptosystem:

Definition of Euler function, examples and properties - Multiplicative property of Euler's function - RSA cryptography.

Units Modulo an Integer:

The group of units modulo an integer, primitive roots- Existence of primitive roots.

Learning Outcomes:

At the end of this unit, the student will be able to

- Analyze the Congruences with a Prime-Power Modulus **L3**
- Analyze the Euler's Function, RSA Cryptosystem and Units Modulo an Integer **L4**

UNIT – III: Quadratic Residues and Quadratic Forms

Quadratic residues, Legendre symbol, Euler's criterion- Gauss lemma, law of quadratic reciprocity-Quadratic residues for prime-power moduli and arbitrary moduli- Binary quadratic forms, equivalent forms- Discriminant, principal forms, positive definite forms, indefinite forms- Representation of a number by a form, examples- Reduction of positive definite forms, reduced forms- Number of proper representations, automorph, class number.

Learning Outcomes:

At the end of this unit, the student will be able to

- Analyze the Quadratic residues **L3**
- Analyze the Quadratic Forms **L4**

UNIT – IV: Sum of Powers, Continued Fractions and Pell's Equation

Sum of Powers:

Sum of two squares, sum of three squares, Waring's problem- Sum of four squares-Fermat's Last Theorem.

Continued Fractions and Pell's Equation:

Finite continued fractions, recurrence relation, Euler's rule- Convergents, infinite continued fractions, representation of irrational numbers- Periodic continued fractions and quadratic irrationals- Solution of Pell's equation by continued fractions.

Learning Outcomes:

At the end of this unit, the student will be able to

- Compute sum of powers and learn Fermat's last theorem. **L3**
- Solve Pell's equation by continued fractions **L4**

UNIT – V: Arithmetic Functions, The Riemann Zeta Function and Dirichlet L Function

Arithmetic Functions:

Definition and examples, multiplicative functions and their properties- Perfect numbers, Mobius function and its properties- Mobius inversion formula- Convolution of arithmetic functions.

The Riemann Zeta Function and Dirichlet L Function:

Historical background for the Riemann Zeta function, Euler product formula, convergence. - Applications to prime numbers- Dirichlet L-functions, Products of two Dirichlet L functions, Euler product formula.

Learning Outcomes:

At the end of this unit, the student will be able to

- Analyze the arithmetic functions **L3**
- Analyze the Riemann Zeta function and its Applications to prime numbers **L4**

Text Books:

1. G. A. Jones & J.M. Jones, Elementary Number Theory, Springer UTM, 2007.
2. Niven, H. S. Zuckerman & H.L. Montgomery, Introduction to the Theory of Numbers, Wiley, 2000.
3. D. Burton; Elementary Number Theory, McGraw-Hill, 2005

Reference Books:

1. Tom M. Apostol, Introduction to Analytical Number theory, Narosa Publishing house, 1998.
2. Elementary number theory and its applications, BEL laboratories.

Course Outcomes:

At the end of this Course the student will be able to

- Understand the basic concepts such as Learn Division algorithm, Euclid's algorithm etc. **L1**
- Analyze the Congruences with a Prime-Power Modulus and RSA Cryptosystem. **L2**
- Analyze the Quadratic residues and Quadratic forms. **L3**
- Solve Pell's equation by continued fractions **L4**
- Analyze the real word problem through the technique of Number theory. **L5**

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B.Tech III Year I Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

19ABS31-SENSORS AND ACTUATORS FOR ENGINEERING APPLICATIONS

(Open Elective-I)

L	T	P	C
3	0	0	3

Course Objectives:

- To provide exposure to various kinds of sensors, actuators and their Engineering applications.
- Capable of understanding the principles and physics of various kinds of sensors from macro to micro/nano level.

UNIT – 1: Introduction to sensors **9 Hrs**

Content of the Unit – I

Sensors, Sensor systems, Nanosensors, -Types of sensors(based on Functions, temperature, pressure, strain, ranging and motion, time- active and passive sensors). Materials used and their fabrication process (Deposition, Pattern and Etching), General characteristics of sensors. Actuators, Functional diagram of actuators, Design of Actuators, Types of actuators (Hydraulic, Pneumatic, Mechanical, Electromagnetic, EAP and EM actuators). Applications of Actuators.

Learning Outcomes:

At the end of this unit, the student will be able to

- Classify different types of Sensors, Actuators and their characteristics
- Identifies the applications of Actuators in different fields
- Explain about different fabrication process of Sensors
- Illustrate functional diagram of Actuators

UNIT – II: Mechanical sensors **9 Hrs**

Content of the Unit – II

Principles of mechanical sensors (piezoresistivity, piezoelectricity, capacitive, inductive and resonant techniques), Displacement sensors, velocity sensors, Torque sensors, flow sensors, Micro and nanosensors, Multimodal nanosensors.

Learning Outcomes:

At the end of this unit, the student will be able to

- Summarize various types of Mechanical sensors
- Explain the working principle of different types mechanical sensors
- Identifies the applications of Mechanical sensors in different environmental conditions
- Understand the basic concepts of micro and nano sensors

UNIT – III: Thermal sensors and Magnetic sensors **9 Hrs**

Content of the Unit – III

Introduction – Principles of Thermal sensors, Thermocouples, Types of thermocouples, Bi-metallic thermometer, Resistance Temperature Detectors (RTD), Advantages and Applications of these temperature sensors.

Introduction, Difference between conventional and magnetic sensors, Types of magnetic sensors (Low field, Earth field and BIAS magnetic field sensors), Working of variable reluctance sensors, Inductive sensors (LVDT), Eddy current sensors, Hall effect sensors, Applications of magnetic sensors.

Learning Outcomes:

At the end of this unit, the student will be able to

- Analyse the difference between conventional sensors and magnetic sensors
- Explain the working principle of different magnetic sensors
- Identifies the applications of Thermal and Magnetic sensors
- Summarize various types of thermal and magnetic sensors

UNIT – IV: Electronic and Optical Sensors-I **9 Hrs**

Content of the Unit – IV

Introduction, Block diagram of electronic sensor system, Microelectronic sensors, semiconductor strain gauge, Gas sensors – Basic principle and working, Applications of electronic sensors – Electronic nose. Optical system components, Solid state optical systems, Optical radiation sources.

Learning Outcomes:

At the end of this unit, the student will be able to

- Explain the working and principle of various electronic and optical sensors
- Explain the block diagram of electronic sensor system
- Identifies the applications Electronic sensors in various fields
- Identify the various optical, solid state system components

UNIT – V: Electronic and Optical Sensors –II **9 Hrs**

Content of the Unit – V

Optical system components, Solid state optical systems, Optical transmitter and filters type (Geometrical optics, Fiber optics, optical Filters), Solid state photoelectric sensors, Photoconductive cells, Photo junction sensors, photon couplers, Example: MEMS transducers, Sensors calibration and compensation.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand the optical system components and solid state optical systems
- Classify different types of Optical filters
- Explain the solid state photoelectric sensors, photo junction sensors and photoconductive cells
- Understand basics of MEMS transducers, sensors calibration and compensation

Text Books:

1. Sensors and Signal Conditioning Wiley-Blackwell, 2008 Jacob Fraden,
2. Piezoelectric Sensors and Actuators: Fundamentals and Applications, Springer,2018Senturia S. D.

Reference Books:

1. Doebelin, "Measurement Systems: Application and Design", McGraw Hill Kogakusha Ltd.
2. Julian W. Gardner, Vijay K. Varadan, Osama O. Awadelkarim "Microsensors, MEMS and Smart Devices", New York: Wiley, 2001.
3. Henry Bolte, "Sensors – A Comprehensive Sensors", John Wiley.
4. Handbook of modern sensors, Springer, Stefan Johann Rupitsch.
5. Microsystem Design, Kluwer Academic Publisher, 2001 J.D. Plummer, M.D. Deal, P.G. Griffin

Course Outcomes:

At the end of this Course the student will be able to

- recognize the need of sensors
- types of sensors which they will able to utilize for the concerned engineering application

B.Tech III Year I Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

19ABS32-PHYSICS OF ELECTRONIC MATERIALS

(Open Elective-I)

L	T	P	C
3	0	0	3

Course Objectives:

- Be able to explain the fundamentals of materials.
- Be able to explain the kinds of semiconductor materials, their physical properties, and their applications.
- Be able to explain the kinds of magnetic materials, their physical properties, advances and their applications.
- Be able to explain the kinds of dielectric materials, their physical properties, advances and their applications.

UNIT – 1: Fundamentals of Materials **9 Hrs**

Content of the Unit – I

Introduction, Phase rule, Phase Diagram, Elementary idea of Nucleation and Growth, Methods of crystal growth. Elementary idea of point, line and planar defects. Concept of thin films, preparation of thin films, Deposition of thin film using sputtering methods (RT and glow discharge).

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand the basic concepts of Phase and Phase diagram
- Understand the straight forward information of Nucleation and Growth
- Explain the preparation and deposition of Thin film using various methods
- Illustrate the methods of Crystal growth
- Summarize the different defects in crystal growth

UNIT – II: Semiconductors **9 Hrs**

Content of the Unit – II

Introduction, charge carriers in semiconductors, effective mass, Diffusion and drift, diffusion length, diffusion and recombination. The Fermi level & Fermi dirac distribution, Temperature dependence of carrier concentration, Invariance of the Fermi level at equilibrium. Band structure, PN junctions and their typical characteristics under equilibrium and under bias, Transistors, MOSFETs.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand the basics concepts regarding drift, diffusion, diffusion length and recombination.
- Classifies the energy bands of a Semiconductors
- Analyse how the position of the fermi level changes with carrier concentration and temperature.
- Explain the concepts regarding PN junctions, Transistors and MOSFETs.

UNIT – III: Optoelectronics **9 Hrs**

Content of the Unit – III

Introduction, Optoelectronic concepts, Hetrostructure p-n junction, Schottky junction and Ohmic contacts, Light emission and absorption, amplification and modulation in semiconductors, Semiconductor Light sources [Light emitting diodes (LEDs) , LASER, vertical cavity surface emitting laser (VCSEL), Quantum well laser {device structure – characteristics – Materials and applications}] and semiconductor Photo detectors [General Characteristics, Responsivity and Impulse response, photoconductors, semiconductor photodiodes].

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand the basic concepts of PN junction and Schottky junction

- Explain about absorption, emission, amplification and modulation
- Illustrate various semiconductor light sources and their structure
- Identifies the characteristics and applications of optoelectronic devices
- Elucidate semiconductor photodetectors

UNIT – IV: Dielectric Materials and their applications **9 Hrs**

Content of the Unit – IV

Introduction, Dielectric properties, Electronic polarisability and susceptibility, dielectric constant and frequency dependence of polarization, Dielectric strength and dielectric loss, Piezoelectric properties.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand the concepts of dielectric constant, polarisability, susceptibility
- Describe how the polarisation of the dielectric constant depends on the frequecy
- Explain about dielectric strength and dielectric loss
- Comprehend dielectric and piezoelectric properties

UNIT – V: Magnetic Materials and their applications **9 Hrs**

Content of the Unit – V

Introduction, Magnetism & various contributions to para and dia magnetism, Fero and Ferri magnetism and ferrites, concepts of Spin waves and Magnons, antiferromagnetism, domains and domain walls, coercive force, hysteresis, Nanomagnetism, Superparamagnetism – Properties and applications.

Learning Outcomes:

At the end of this unit, the student will be able to

- Differentiate different types of magnetic materials depending upon their properties
- Understand the concepts of Spin waves and Magnons
- Interpret the concepts of domains and domain walls
- Explain about the properties of Nanomagnetism, Super paramagnetism
- Identify the applications of magnetic materials

Text Books:

1. S.O. Kasap Principles of Electronic Materials and Devices, 3rd edition, McGraw-Hill Education (India) Pvt. Ltd., 2007.
2. Electrical Engineering Materials",by A.J. Dekker, PHI Pub.
3. "Electronic Components and Materials" Grover and Jamwal, DhanpatRai and Co.

Reference Books:

1. B.G. Streetman and S. Banerjee, Solid State Electronic Devices, 6th edition, PHI Learning,
2. Eugene A. Irene, Electronic Materials Science, Wiley, 2005
3. Wei Gao, Zhengwei Li, Nigel Sammes, An Introduction to Electronic Materials for Engineers, 2nd Edition, World Scientific Publishing Co. Pvt. Ltd., 2011
4. W D Callister, Materials Science and Engineering – An Introduction, Jr., John Willey and Sons, Inc, New York, 7th edition, 2007.
5. "A First Course In Material Science" by Raghvan, McGraw Hill Pub.
6. "Solid State Physics" by S.O.Pillai,New Age Publication.
7. 'The Science and Engineering of materials' by Donald R.Askeland,Chapman& Hall Pub.

Course Outcomes:

At the end of this Course the student will be able to

- Recognize the need of semiconductors
- Dielectric and magnetic materials which they will able to utilize for the concerned engineering application

B.Tech III Year I Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

19ABS41-CHEMISTRY OF ENERGY MATERIALS

(Open Elective-I)

L	T	P	C
3	0	0	3

Course Objectives:

- To make the student understand basic electrochemical principles such as standard electrode potentials, EMF and applications of electrochemical principles in the design of batteries.
- To understand the basic concepts of processing and limitations of fossil fuels and Fuel cells & their applications.
- To impart knowledge to the students about fundamental concepts of hydrogen storage in different materials and liquefaction method
- Necessasity of harnessing alternate energy resources such as solar energy and its basic concepts.
- To understand and apply the basics of calculations related to material and energy flow in the processes.

UNIT – 1: Electrochemical Systems **9 Hrs**

Galvanic cell, standard electrode potential, application of EMF, Electrode mechanism, polarization, Batteries-Lead-acid and Lithium ion batteries.

Learning Outcomes:

At the end of this unit, the student will be able to

- Solve the problems based on electrode potential L3
- Describe the Galvanic Cell L2
- Differentiate between Lead acid and Lithium ion batteries L2
- Illustrate the electrical double layer L2

UNIT – II: : Fuel Cells

Basic design of fuel cell, Fuel cell working principle, Fuel cell efficiency Classification of fuel cells, Polymer electrolyte membrane (PEM) fuel cells, Solid-oxide fuel cells (SOFC), and their applications

Learning Outcomes:

At the end of this unit, the student will be able to

- Describe the working Principle of Fuel cell L2
- Explain the efficiency of the fuel cell L2
- Discuss about the Basic design of fuel cells L3
- Classify the fuel cell L2

UNIT – III: Hydrogen Storage

Hydrogen Storage, Chemical and Physical methods of hydrogen storage, Hydrogen Storage in metal hydrides, metal organic frame works (MOF), Carbon structures (Carbon nano tubes, fullerenes), metal oxide porous structures, hydrogen storage by high pressure methods. Liquefaction method

Learning Outcomes:

At the end of this unit, the student will be able to

- Differentiate Chemical and Physical methods of hydrogen storage L2
- Discuss the metal organic frame work L3
- Illustrate the carbon and metal oxide porous structures L2
- Describe the liquification methods L2

Sury

UNIT – IV: Solar Energy

Solar energy introduction and prospects, photovoltaic (PV) technology, concentrated solar power (CSP), Solar Fuels – Hydrogen: Ammonia& Hydrazine, Solar cells (Si-Te& Cd-Te), advantages and disadvantages.

Learning Outcomes:

At the end of this unit, the student will be able to

- Apply the photo voltaic technology L3
- Demonstrate about solar energy and prospects L2
- Illustrate the Solar cells L2
- Discuss about concentrated solar power L3

UNIT – V: Photo and Photoelectrochemical Conversions

Photochemical cells and applications of photochemical reactions, specificity of photo electrochemical cell, advantage of photoelectron catalytic conversions.

Learning Outcomes:

At the end of this unit, the student will be able to

- Differentiate between Photo and Photo electrochemical Conversions L2
- Illustrate the photochemical cells L2
- Identify the applications of photochemical reactions L3
- Interpret advantages of photoelectron catalytic conversion L2

Text Books:

1. Bahl and Bahl and Tuli, Essentials of Physical Chemistry, S. Chand Publications, New Delhi, 28th Edition, 2020.
2. US Department of Energy (EG&G technical services and corporation), Fuel Cell Hand Book 7th Edition, 2004.

Reference Books:

1. Ira N. Levine, Physical chemistry 6th Edition, McGraw Hills Education, New Delhi, 2009.
2. Silver and Atkins, Inorganic Chemistry, , 7th Edition, Oxford University Press, 2018.
3. Michael Hirscher, Hand book of Hydrogen Storage: New materials for future energy, storage, Wiley-VCH Verlag GmbH & Co. KGaA, 2010
4. Klaus Jagar et.al., Solar energy fundamental, technology and systems, UIT-Cambridge publishers, 2016

Course Outcomes:

At the end of this Course the student will be able to

- Understand to perform simultaneous material and energy balances **L1**
- Lists about various electrochemical and energy systems **L1**
- Classify solid, liquid and gaseous fuels **L3**
- Analyze the energy demand of world, nation and available resources to fulfill the demand **L3**
- Evaluate the conventional energy resources and their effective utilization **L3**
- To be able to understand and perform the various characterization techniques of fuels **L1**
- Explain knowledge of modern energy conversion technologies **L2**
- To be able to identify available nonconventional (renewable) energy resources and techniques to utilize them effectively **L1**

B.Tech III Year I Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

19ABS42-ADVANCED POLYMERS AND THEIR APPLICATIONS

(Open Elective-I)

L	T	P	C
3	0	0	3

Course Objectives:

- To understand the basic principles of polymers
- To synthesize the different polymeric materials and their characterization by various instrumental methods.
- To impart knowledge to the students about fundamental concepts of Hydro gels of polymer networks, surface phenomenon by micelles
- To enumerate the applications of polymers in engineering

UNIT – I: Polymers-Basics and Characterization **9 Hrs**

Basic concepts: monomers, repeat units, degree of polymerization, linear, branched and network polymers, classification of polymers, Polymerization mechanisms: condensation, addition, radical chain, ionic and coordination copolymerization, Zeigler-Natta and Ring opening metathesis polymerization. Average molecular weight concepts: number, weight and viscosity average molecular weights, polydispersity and molecular weight distribution. Measurement of molecular weight: end group, viscosity, light scattering, osmotic and ultracentrifugation methods, analysis and testing of polymers, Characterization of polymers by XRD, DSC.

Learning Outcomes:

At the end of this unit, the student will be able to

- Classify the polymers **L3**
- Explain polymerization mechanism **L2**
- Differentiate addition, condensation polymerizations **L2**
- Describe measurement of molecular weight of polymer **L2**

UNIT – II: : Synthetic Polymers

Polymerization processes – Bulk, Solution, Suspension and Emulsion polymerization. Preparation and significance, classification of polymers based on physical properties, Thermoplastics, Thermosetting plastics, Fibers and elastomers, General Applications.

Preparation of Polymers based on different types of monomers, Olefin polymers, Diene polymers, nylons, Urea - formaldehyde, phenol - formaldehyde and melamine Epoxy and Ion exchange resins

Learning Outcomes:

At the end of this unit, the student will be able to

- Differentiate Bulk, solution, Suspension and emulsion polymerization **L2**
- Describe fibers and elastomers **L2**
- Identify the thermosetting and thermo polymers **L3**

UNIT – III: Natural Polymers & Modified cellulosics

Natural Polymers: Chemical & Physical structure, properties, source, important chemical modifications, applications of polymers such as cellulose, lignin, starch, rosin, shellac, latexes, vegetable oils and gums, proteins. Modified cellulosics: Cellulose esters and ethers such as Ethyl cellulose, CMC, HPMC, cellulose acetals, Liquid crystalline polymers; specialty plastics- PES, PAES, PEEK, PEA

Learning Outcomes:

At the end of this unit, the student will be able to

- Describe the properties and applications of polymers **L2**

- Interpret the properties of cellulose, lignin, starch, rosin, latex etc., **L2**
- Discuss the special plastics of PES, PAES, PEEK etc., **L3**
- Explain modified cellulosics **L2**

UNIT – IV: Hydrogels of Polymer networks and Drug delivery

Definitions of Hydrogel, polymer networks, Types of polymer networks, Methods involved in hydrogel preparation, Classification, Properties of hydrogels, **Applications** of hydrogels in drug delivery. Introduction to drug systems including, drug development, regulation, absorption and disposition, routes of administration and dosage forms. Advanced drug delivery systems and controlled release.

Learning Outcomes:

At the end of this unit, the student will be able to

- Identify types of polymer networks **L3**
- Describe methods involve in hydrogel preparation **L2**
- Explain applications of hydrogels in drug delivery **L2**
- Demonstrate the advanced drug delivery systems and controlled release **L2**

UNIT – V: Surface phenomena

Surface tension, adsorption on solids, electrical phenomena at interfaces including electro-kinetics, micelles, reverse micelles, solubilization. XPS principle-application of photoelectron spectroscopy, ESCA and Auger spectroscopy to the study of surfaces.

Learning Outcomes:

At the end of this unit, the student will be able to

- Demonstrate electrical phenomena at interfaces including electrokinetics, miselles, reverse micelles etc., **L3**
- Explain photoelectron spectroscopy **L2**
- Discuss ESCA and Auger spectroscopy to the study of surfaces **L3**
- Differentiate micelles and reverse micelles **L2**

Text Books:

1. Fred W.Billmayer, A Text book of Polymer science, 3rd Edition, Wiley India, 2007.
2. K.J.Saunders, Organic polymer Chemistry, Chapman and Hall, 1973.

Reference Books:

1. B.Miller, Advanced Organic Chemistry, Prentice Hall, 2nd Edn, 2003.
2. Ambikanandan Misra, Aliasgar Shahiwala, Applications of polymers in Drug delivery system, Elsevier Pub., 2020.
3. Gowarikar, Polymer Chemistry –New Age International Publications, 2019.
4. Physical Chemistry , Samel Galsstone, Lan Caster Press, 1970.

Course Outcomes:

At the end of this Course the student will be able to

- Understand the state of art synthesis of Polymeric materials **L1**
- Understand the hydro gels preparation, properties and applications in drug delivery system. **L2**
- Characterize polymers materials using XPS. **L2**
- Analyze surface phenomenon of micelles and characterize using photoelectron spectroscopy, ESCA and Auger spectroscopy. **L3**

B.Tech III Year I Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

19ABS43-Marine Chemistry

(Open Elective-I)

L	T	P	C
3	0	0	3

Course Objectives:

- To classify the different dissolved gases in sea water.
- To predict the role of biological processes in affecting oceanic carbonate system.
- To describe chemical and pharmacological properties of bioactive substances in marine organisms.
- To determine micro-nutrient elements (N, P, Si) in seawater.
- To identify dissolved elements in the estuary.

UNIT – 1: Dissolved gases in seawater **9 Hrs**

Dissolution of gases in seawater and their solubility; classification of dissolved gases and factors affecting their concentration in seawater; distribution of dissolved oxygen in seawater and affecting factors, Apparent Oxygen Utilization (AOU) and oxygen minimum zone formation in the ocean, origin and consequences of ocean hypoxia, Methane hydrate, clathrates

Learning Outcomes:

At the end of this unit, the student will be able to

- Explain the factors affecting on the dissolution of gases **L1**
- Understand apparent oxygen utilization and ozygen minimum zone formation in ocean. **L1**
- Compare the distribution of dissolved gaseous in sea water **L4**
- Analyze origin and consequences of ocean hypoxia, methane hydrate and clathrates **L3**

UNIT – II: : Carbonate systems in the ocean

Acid base equilibria in seawater, carbon dioxide system – absorption of carbon dioxide, carbon cycle; parameters of carbonate systems and their distribution in the ocean; role of biological processes in affecting oceanic carbonate system; precipitation and dissolution of calcium carbonate in seawater, lysocline and carbonate compensation depth; Ocean acidification

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand the basic principle of acid-base equibria in sea water **L1**
- Explain the concept of carbon cycle **L1**
- Lists the various biological process in affecting oceanic carbonate, pptn and dissolution **L1**
- Analyze the parameters of carbonate system in oceanic water **L3**

UNIT – III: Chemistry of marine natural products

Biomedical aspects; chemical and pharmacological properties of bioactive substances in marine organisms, carbohydrates and their derivatives in red and brown algae, aliphatic acids and their derivatives in marine organisms, steroids and their use as biomarkers, nitrogenous compounds in invertebrates, nucleosides from sponges, biopolymer

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand the chemical and pharmacological properties of bioactive substances in marine organism **L1**
- Explain the steroids and their use as biomarkers **L2**
- List the chemical properties in nitrogenous compounds in invertebrates **L1**

UNIT – IV: Micronutrients in seawater

Micro-nutrient elements (N, P, Si) in seawater, their forms, distribution and seasonal variation in the ocean. Stoichiometry of uptake and regeneration of nutrients elements and Apparent Oxygen Utilization (AOU)

Learning Outcomes:

At the end of this unit, the student will be able to

- List the micro-nutrients in sea water **L1**
- Understand the stoichiometry of uptake and regeneration of nutrients **L1**
- Differentiate the distribution of micronutrients with seasonal variation in the ocean **L2**

UNIT – V: Estuarine chemistry

Behavior of dissolved and particulate material during estuarine mixing, interaction among them and speciation of dissolved elements in the estuary; physico-chemical characteristics of estuarine sediment, anoxic sediments and pore water; heavy metals in estuaries and the processes affecting their distribution

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand the behavior of dissolved and particulate matter in estuarine system **L1**
- Analyze the physicochemical characteristics of estuarine system **L3**
- Differentiate the effect of heavy metals in estuaries and affecting in distribution **L2**

Text Books:

1. Riley, J.P. and Chester, R., Introduction to Marine Chemistry, Academic Press, 1971.
2. Chester, R., Marine Geochemistry, Blackwell Science, 1990, 2000

Reference Books:

1. Riley, J.P., Skirrow, G, Chemical Oceanography (Vol.1,2, 3), Academic Press, 1975.
2. Horne, R.A, Marine Chemistry - The Structure of Water and the Chemistry of the Hydrosphere, 1969 Wiley- Interscience.
3. Seawater: Its composition, properties & behaviour, 2nd Edn, The Open University Team, 1989
4. Martin, D.F., Marcel Dekker, Marine Chemistry (Vol.2), 2nd Edition, Academic Press, NY, 1970.
5. Broecker and Peng, Tracers in the Sea, Lamont-Doherty Geological Observatory, 1982, NY.
6. Chemical Oceanography, 1992 – Millero, F. J. and Sohn, M.L., CRC Press
7. Burton et al., Dynamic processes in the chemistry of the upper ocean, Plenum Press, 1986.
8. Heinrich D Holland, The Chemistry of the Atmosphere and Oceans, John Wiley & sons Inc, 1978.

Course Outcomes:

At the end of this Course the student will be able to

- List the various dissolved gases in sea water and factors affecting their. **L1**
- Demonstrate knowledge of concepts and principles of ocean acidification. Analyse and evaluate biomedical aspects of marine natural products. **L2**
- Integrate and apply the knowledge of stoichiometry of uptake and regeneration of nutrients elements. **L3**
- Reflect on the influence heavy metals in estuaries. **L4**
- Evaluate total findings in marine chemistry to solve engineering problems **L3**

B.Tech III Year I Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

19ACE55a-AIR POLLUTION AND CONTROL

(Open Elective-I)

L	T	P	C
3	0	0	3

Course Objectives: The objectives of the course are to make the students learn about

- To teach the basics of air pollution
- To impart the behavior of air due to metrological influence
- To throw light on air quality management
- To teach the design of air pollution control methods

UNIT – I:

INTRODUCTION : Air Pollution – Definitions, Scope, Significance and Episodes, Air Pollutants – Classifications – Natural and Artificial – Primary and Secondary, point and Non- Point, Line and Areal Sources of air pollution- stationary and mobile sources.

EFFECTS OF AIR POLLUTION : Effects of Air pollutants on man, material and vegetation: Global effects of air pollution – Green House effect, Heat Islands, Acid Rains, Ozone Holesetc.

Learning Outcomes:

At the end of this unit, the student will be able to

- Learn the basics of air pollutants.
- Estimate the impact of air pollution

UNIT – II:

THERMODYNAMIC OF AIR POLLUTION: Thermodynamics and Kinetics of Air-pollution – Applications in the removal of gases like Sox, Nox, CO, HC etc., air-fuel ratio. Computation and Control of products of combustion.

PLUME BEHAVIOUR : Meteorology and plume Dispersion; properties of atmosphere; Heat, Pressure, Wind forces, Moisture and relative Humidity, Influence of Meteorological phenomena on Air Quality-wind rosediagrams.

Learning Outcomes:

At the end of this unit, the student will be able to

- Study properties of atmosphere
- Learn plume behavior in different environmental conditions
- Analyse and compute the parameters of air pollutants
- Evaluate procedures for control of pollution

UNIT – III:

POLLUTANT DISPERSION MODELS : Lapse Rates, Pressure Systems, Winds and moisture plume behaviour and plume Rise Models; Gaussian Model for Plume Dispersion.

CONTROL OF PARTICULATES : Control of particulates – Control at Sources, Process Changes, Equipment modifications, Design and operation of control, Equipment"s – Settling Chambers, Centrifugal separators, filters Dry and Wet scrubbers, Electrostatic precipitators.

Learning Outcomes:

At the end of this unit, the student will be able to

- Learn the design principles of particulate control.
- Learn and design pollutant dispersion models

UNIT – IV:

CONTROL OF GASEOUS POLLUTANTS : General Methods of Control of Nox and Sox emissions – In-plant Control Measures, process changes, dry and wet methods of removal and recycling.

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Learning Outcomes:

At the end of this unit, the student will be able to

- Learn the design principles of gaseous control.
- Develop environmental friendly fuels and study their properties.

UNIT – V:

AIR QUALITY MANAGEMENT : Air Quality Management – Monitoring of SPM, SO; NO and CO Emission Standards.

Learning Outcomes:

At the end of this unit, the student will be able to

- Study the air quality management.
- Visualize emissions and their permissible standards

Text Books:

1. Air Quality by Thodgodish, Levis Publishers, Special India Edition, NewDelhi
2. Air pollution By M.N.Rao and H.V.N.Rao – Tata Mc.Graw HillCompany.
3. Air pollution by Wark and Warner.- Harper & Row, NewYork.

Reference Books:

1. An introduction to Air pollution by R.K. Trivedy and P.K. Goel, B.S.Publications
2. Air Pollution and Control by K.V.S.G.Murali Krishna, Kousal& Co. Publications, New Delhi.
3. Enivronmental meteorology by S.Padmanabhammurthy ,I.K.InternationalsPvtLtd,New Delhi

Course Outcomes:

At the end of this Course the student will be able to

- Evaluating the ambient air quality based on the analysis of air pollutants
- Design particulate and gaseous control measures for an industry
- Judge the plume behavior in a prevailing environmental condition
- Estimate carbon credits for various day to day activities

B.Tech III Year I Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

19ACE55b-GREEN BUILDINGS

(Open Elective-I)

L	T	P	C
3	0	0	3

Course Objectives: The objectives of the course are to make the students learn about
- Learn the principles of planning and orientation ofgreen buildings.
- Acquire knowledge on various aspects of green buildings

UNIT – I:

Introduction:ConceptofGreenBuilding,NeedforGreenBuilding,Benefitsof' Green Buildings, Green Building Materials and Equipment in India, Key Requisites for Constructing a Green Building, Important Sustainable features for Green Building,

Learning Outcomes:

At the end of this unit, the student will be able to
- Understand need for green building
- Obtain knowledge on features of green building

UNIT – II:

Green Building Concepts and Practices: Indian Green Building Council,Green Building Moment in India, Benefits Experienced in Green Buildings, Launch of Green Building Rating Systems, Residential Sector, Market Transformation;

Green **Building** Opportunities And **Benefits:** Opportunities of Green Building, Green BuildingFeatures,MaterialandResources,WaterEfficiency,OptimumEnergyEfficiency, Typical Energy Saving Approach in Buildings, LEED India Rating System and Energy Efficiency,

Learning Outcomes:

At the end of this unit, the student will be able to
- Knowledge on benefits and energy efficiency of green buildings
- Knowledge on practices and concepts of green buildings

UNIT – III:

Green Building Design Introduction, Reduction in Energy Demand, Onsite Sources and Sinks, Maximise System Efficiency, Steps to Reduce Energy Demand and Use Onsite Sources and Sinks, Use of Renewable Energy Sources. Ecofriendly captive power generation for factory, Building requirement,

Learning Outcomes:

At the end of this unit, the student will be able to
- Learn steps in design of green buildings
- Learn how renewable energy resources are used in green buildings

UNIT – IV:

Air Conditioning Introduction, CII Godrej Green business centre, Design philosophy, Design interventions, Energy modeling, HVAC System design, Chiller selection,pump selection, Selection of cooling towers, Selection of air handing units, Precooling of fresh air, Interior lighting system, Key feature of the building. Eco- friendly captive power generation for factory, Building requirement.

Learning Outcomes:

At the end of this unit, the student will be able to
- Learn designing of air conditioning in green building

UNIT – V:

Material Conservation Handling of non process waste, waste reduction during construction, materials with recycled content, local materials, material reuse, certified wood, Rapidly renewable building materials and furniture; Indoor Environment Quality And Occupational Health: Air conditioning, Indoor air quality, Sick building syndrome, Tobacco smoke control, Minimum fresh air requirements avoid use of asbestos in the building, improved fresh air ventilation, Measure of IAQ, Reasons for poor IAQ, Measures to achieve Acceptable IAQ levels

Learning Outcomes:

At the end of this unit, the student will be able to

- Suggest materials and technologies to improve energy efficiency of building.

Text Books:

1. Handbook on Green Practices published by Indian Society of Heating Refrigerating and Air conditioning Engineers,2009.
2. Green Building Hand Book by Tomwoolley and Samkimings,2009.

Reference Books:

1. Complete Guide to Green Buildings by Trish riley
2. Standard for the design for High Performance Green Buildings by Kent Peterson, 2009

Course Outcomes:

At the end of this Course the student will be able to

- Explain the principles of green buildings , its byelaws
- Understand the concepts of design of green buildings and material conversation in green buildings
- knowledge on rating systems of green buildings
- Suggest materials and technologies to improve energy efficiency of building.

B.Tech III Year I Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

19ACE55c-BASICS OF CIVIL ENGINEERING MATERIALS AND CONSTRUCTION PRACTICE

(Open Elective-I)

L	T	P	C
3	0	0	3

Course Objectives: The objectives of the course are to make the students learn about

- To provide an insight and inculcate the essentials of Civil Engineering discipline to the students of all branches of Engineering
- to provide the students an illustration of the significance of the Civil Engineering Profession in satisfying the societal needs.

UNIT – I:

Introduction to Civil Engineering Building planning: Introduction to types of buildings as per NBC; Selection of site for buildings. Components of a residential building and their functions. Introduction to industrial buildings- office / factory / software development office / power house / electronic equipment service centre

Learning Outcomes:

At the end of this unit, the student will be able to

- learn different types of buildings as per NBC and their components and function
- learn how to select different type of buildings sites

UNIT – II:

Site plan, Orientation of a building, Open space requirements, Position of doors and windows, Size of rooms; Preparation of a scaled sketch of the plan of a single storeyed residential building in a given site plan. Introduction to the various building area terms - Computation of plinth area/ built up area, Floor area / carpet area - for a simple single storeyed building; Setting out of a building.

Learning Outcomes:

At the end of this unit, the student will be able to

- .learn site plans and orientation of buildings.
- learn setting out a building and preparation of scaled sketch of building plans

UNIT – III:

Surveying - Principles and objectives of surveying; Horizontal measurements – instruments used – tape, types of tapes; Ranging(direct ranging only) Theodolite and Total station-Principles

Learning Outcomes:

At the end of this unit, the student will be able to

- learn principles and objectives of surveying.
- learn instruments used in surveying and application in field

UNIT – IV:

Building materials: Bricks, cement blocks - Properties and specifications.Cement – OPC, properties, grades; other types of cement and its uses (in brief). Cement mortar – constituents, preparation. Concrete – PCC and RCC – grades. Steel - Use of steel in building construction, types and market forms.

Learning Outcomes:

At the end of this unit, the student will be able to

- learn basic civil engineering materials (bricks, cement, cement mortar, cement concrete)
- learn about steel and use of steel in building construction

UNIT – V:

Building construction – Foundations; Bearing capacity of soil (definitiononly); Functions of foundations, Types - shallow and deep (sketches only).

Brick masonry – header and stretcher bond, English bonds – Elevation and plan (one brick thick walls only).

Roofs – functions, types, roofing materials (brief discussion only).

Floors – functions, types; flooring materials (brief discussion only).

Decorative finishes – Plastering – Purpose, procedure.

Paints and Painting – Purpose, types, preparation of surfaces for painting (brief discussion only).

Learning Outcomes:

At the end of this unit, the student will be able to

- learn foundations, SBC and theirs functions.
- learn about brick masonry(header, stretcher bond and english bond).
- learn roofs, floors and their materials

Text Books:

1. Rangwala, S. C., Essentials of Civil Engineering, Charotar Publishing House
2. Rangwala, S. C. and Dalal, K. B., Engineering Materials, Charotar Publishing house
3. Rangwala, S. C. and Dalal, K. B., Building Construction, Charotar Publishing house
4. Dr. K. R. Arora, "Surveying Volume-1", Standard book house, New Delhi, 13th Edition, 2012. 2. S. K. Duggal, "SurveyingVolume-2", Tata McGraw-Hill Education Private Limited, India,New Delhi, 3rd Edition, 2009.

Reference Books:

Course Outcomes:

At the end of this Course the student will be able to

- Recall the role of civil engineer in society and to relate the various disciplines of Civil Engineering.
- Explain different types of buildings, building components, building materials and building construction
- Describe the importance, objectives and principles of surveying.

B.Tech III Year I Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

19AEE55a- BASICS OF NON-CONVENTIONAL ENERGY SOURCES

(Open Elective-I)

L	T	P	C
3	0	0	3

Course Objectives: The objectives of the course are to make the students learn about

- Identify various sources of Energy and the need of Renewable Energy Systems
- Understand the concepts of Solar Radiation, Wind energy and its applications
- Distinguish between solar thermal and solar PV systems
- Interpret the concept of geo thermal energy and its applications
- Understand the use of biomass energy and the concept of Ocean energy and fuel cells.

UNIT – I: Solar Energy **10 Hrs**

Solar radiation - beam and diffuse radiation, solar constant, earth sun angles, attenuation and measurement of solar radiation, local solar time, derived solar angles, sunrise, sunset and day length. flat plate collectors, concentrating collectors, storage of solar energy thermal storage.

Learning Outcomes:

At the end of this unit, the student will be able to

- To understand about solar thermal parameters
- To distinguish between flat plate and concentrated solar collectors
- To know about thermal storage requirements
- To know about measurement of solar radiation

UNIT – II: PV Energy Systems **10 Hrs**

Introduction, The PV effect in crystalline silicon basic principles, the film PV, Other PV technologies, Electrical characteristics of silicon PV cells and modules, PV systems for remote power, Grid connected PV systems..

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand the concept of PV effect in crystalline silicon and their characteristics
- Understand other PV technologies
- To know about electrical characteristics of PV cells & modules
- To know about grid connected PV systems

UNIT – III: Wind Energy **10 Hrs**

Principle of wind energy conversion; Basic components of wind energy conversion systems; wind mill components, various types and their constructional features; design considerations of horizontal and vertical axis wind machines: analysis of aerodynamic forces acting on wind mill blades and estimation of power output; wind data and site selection considerations

Learning Outcomes:

At the end of this unit, the student will be able to

- To understand basics of wind energy conversion and system
- To distinguish between VAWT and HAWT systems
- To understand about design considerations
- To know about site selection considerations of WECS

UNIT – IV: Geothermal Energy **10 Hrs**

Estimation and nature of geothermal energy, geothermal sources and resources like hydrothermal, geo-pressured hot dry rock, magma. Advantages, disadvantages and application of geothermal energy, prospects of geothermal energy in India..

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand the Geothermal energy and its mechanism of production and its Applications
- Analyze the concept of producing Geothermal energies
- To learn about disadvantages and advantages of Geo Thermal Energy Systems
- To know about various applications of GTES

UNIT – V: Miscellaneous Energy Technologies **10 Hrs**

Ocean Energy: Tidal Energy-Principle of working, performance and limitations. Wave Energy-Principle of working, performance and limitations.

Bio mass Energy: Biomass conversion technologies, Biogas generation plants, Classification, advantages and disadvantages, constructional details, site selection, digester design consideration

Fuel cell: Principle of working of various types of fuel cells and their working, performance and limitations.

Learning Outcomes:

At the end of this unit, the student will be able to

- Analyze the operation of tidal energy
- Analyze the operation of wave energy
- Analyze the operation of bio mass energy
- Understand the principle, working and performance of fuel cell technology
- Apply these technologies to generate power for usage at remote centres

Text Books:

1. Stephen Peake, "Renewable Energy Power for a Sustainable Future", Oxford International Edition, 2018.
2. G. D. Rai, "Non-Conventional Energy Sources", 4th Edition, Khanna Publishers, 2000.

Reference Books:

1. S. P. Sukhatme, "Solar Energy",3rd Edition, Tata Mc Graw Hill Education Pvt. Ltd,2008.
2. B H Khan , " Non-Conventional Energy Resources", 2nd Edition, Tata Mc Graw Hill Education Pvt Ltd, 2011.
3. S. Hasan Saeed and D.K.Sharma,"Non-Conventional Energy Resources",3rd Edition, S.K.Kataria& Sons, 2012.
4. G. N. Tiwari and M.K.Ghosal, "Renewable Energy Resource: Basic Principles and Applications", Narosa Publishing House, 2004.

Course Outcomes:

At the end of this Course the student will be able to

- To distinguish between various alternate sources of energy for different suitable application requirements
- To differentiate between solar thermal and PV system energy generation strategies
- To understand about wind energy system
- To get exposed to the basics of Geo Thermal Energy Systems
- To know about various diversified energy scenarios of ocean, biomass and fuel cells

B.Tech III Year I Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

19AEE55b- ELECTRICAL MEASUREMENTS & SENSORS

(Open Elective-I)

L	T	P	C
3	0	0	3

Course Objectives: The objectives of the course are to make the students learn about

- The basic principles of different types of electrical instruments for the measurement of voltage, current, power factor, power and energy.
- The measurements of RLC parameters using bridge principles.
- The principles of magnetic measurements.
- The principle of working of CRO and its applications.
- Extending the range of an Instrument.

UNIT – I: Measuring Instruments **10 Hrs**

Classification – Ammeters and Voltmeters – PMMC, Dynamometer, Moving Iron Types – Expression for the Deflecting Torque and Control Torque – Errors and their Compensation, Extension of range–Numerical examples

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand the operation of different in struments.
- Know the different types of errors and their compensation

UNIT – II: Measurement of Power, Power Factor and Energy **10 Hrs**

Single Phase Dynamometer Wattmeter, LPF and UPF, Double Element and Three Elements, Expression for Deflecting and Control Torques; P.F. Meters: Dynamometer and Moving Iron Type–1-phand3-ph Power factor Meters. Single Phase Induction Type Energy Meter-Driving and Braking Torques–Errors and their Compensation, Three Phase Energy Meter-Numerical examples

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand the working principles and construction of different types of Energy meters
- Distinguish between low and high power factor ranges in wattmeters

UNIT – III: Instrument transformers, Potentiometers, and magnetic measurements **10 Hrs**

Current Transformers and Potential Transformers – Ratio and Phase Angle Errors – MethodsforReductionofErrors-DesignConsiderations.DCPotentiometers: Principle and Operation of D.C. Crompton's Potentiometer –Standardization – Measurement of unknown Resistance, Currents and Voltages. A.C. Potentiometers: Polar and Coordinate types-Standardization – Applications. Determination of B-H Loop Methods of Reversals – Six Point magnetic measurement Method–A.C.Testing–Iron Loss of Bar Samples –Numerical Examples

Learning Outcomes:

At the end of this unit, the student will be able to

- Distinguish between CTs and PTs
- Understand the principles and working of various measuring instruments used to detect electrical circuit parameters R,L,C

UNIT – IV: D.C & A.C Bridges **10 Hrs**

Method of Measuring Low, Medium and High Resistances – Sensitivity of Wheat stone's Bridge – Kelvin's Double Bridge for Measuring Low Resistance, Measurement of High Resistance –Loss of Charge Method. Measurement of Inductance-Maxwell's Bridge, Anderson's Bridge. Measurement of Capacitance and Loss Angle – DeSauty Bridge. Wien's Bridge –Schering Bridge–Numerical Examples

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand the bridge configurations and their applications for various ranges of resistance measurement
- Compute the unknown parameters of Inductance and Capacitance using the bridges

UNIT – V: CRO and Digital Meters **10 Hrs**

Cathode Ray Oscilloscope-Cathode Ray Tube-Time Base Generator-Horizontal and Vertical Amplifiers–Applications of CRO–Measurement of Phase, Frequency, Current and Voltage-Lissajous Patterns. Digital Voltmeters – Successive Approximation, Ramp, and Integrating Type-Digital Frequency Meter-Digital Multimeter- Digital Tachometer.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand the operation of CRO and its parts
- Know about Digital voltmeters and Distinguish between an along and digital meters

Text Books:

1. Electrical & Electronic Measurement & Instruments by A.K.Sawhney Dhanpat Rai & Co. Publications, 2007.
2. Electrical Measurements and measuring Instruments–by E.W.Golding and F.C.Widdis, 5th Edition, Reem Publications,2011.

Reference Books:

1. Electronic Instrumentation by H.S. Kalsi, Tata McGraw-Hill, 3rd Edition, 2011.
2. Electrical Measurements: Fundamentals, Concepts, Applications –by Reissland, M.U, New Age International (P) Limited,2010.
3. Electrical & Electronic Measurement & Instrumentation by R.K.Rajput,2nd Edition, S.Chand & Co., 2nd Edition,2013.

Course Outcomes:

At the end of this Course the student will be able to

• Understand the working of various instruments and equipments used for the measurement of various electrical engineering parameters like voltage, current, power, phase etc in industry as well as in power generation, transmission and distribution sectors	L1
• Analyze and solve the varieties of problems and issues coming up in the vast field of electrical measurements.	L2
• Analyze the different operation of extension range ammeters and voltmeters,	L3
• Design and development of various voltage and current measuring meters.	L4
• Analyze DC and AC bridges for measurement of parameters and different characteristics of periodic and a periodic signals using CRO.	L5

B.Tech III Year I Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

19AEE55c- ELECTRIC VEHICLE ENGINEERING

(Open Elective-I)

L	T	P	C
3	0	0	3

Course Objectives: The objectives of the course are to make the students learn about

- To get exposed to new technologies of battery electric vehicles, fuel cell electric vehicles
- To get exposed to EV system configuration and parameters
- To know about electro mobility and environmental issues of EVs
- To understand about basic EV propulsion and dynamics
- To understand about fuel cell technologies for EV and HVEs
- To know about basic battery charging and control strategies used in electric vehicles

UNIT – I: Introduction to EV Systems and Parameters **10 Hrs**

Past, Present and Future EV, EV Concept, EV Technology, State-of-the Art EVs, EV configuration, EV system, Fixed and Variable gearing, single and multiple motor drive, in-wheel drives, EV parameters: Weight, size, force and energy, performance parameters.

Learning Outcomes:

At the end of this unit, the student will be able to

- To know about past, present and latest technologies of EV **L1**
- To understand about configurations of EV systems **L1**
- To distinguish between EV parameters and performance parameters of EV systems **L2**
- To distinguish between single and multiple motor drive EVs **L4**
- To understand about in-wheel EV **L5**

UNIT – II: EV and Energy Sources **10 Hrs**

Electro mobility and the environment, history of Electric power trains, carbon emissions from fuels, green houses and pollutants, comparison of conventional, battery, hybrid and fuel cell electric systems

Learning Outcomes:

At the end of this unit, the student will be able to

- To know about various types of EV sources **L1**
- To understand about e-mobility **L2**
- To know about environmental aspects of EV **L3**
- To distinguish between conventional and recent technology developments in EV systems **L4**

UNIT – III: EV Propulsion and Dynamics **10 Hrs**

Choice of electric propulsion system, block diagram, concept of EV Motors, single and multi motor configurations, fixed and variable geared transmission, In-wheel motor configuration, classification, Electric motors used in current vehicle applications, Recent EV Motors, Vehicle load factors, vehicle acceleration.

Learning Outcomes:

At the end of this unit, the student will be able to

- To know about what is meant by propulsion system **L1**
- To understand about single and multi motor EV configurations **L2**
- To get exposed to current and recent applications of EV **L3**
- To understand about load factors in vehicle dynamics **L4**
- To know what is meant acceleration in EV **L5**

UNIT – IV: Fuel Cells **10 Hrs**

Introduction of fuel cells, basic operation, model, voltage, power and efficiency, power plant system – characteristics, sizing, Example of fuel cell electric vehicle. Introduction to HEV, brake specific fuel consumption, comparison of series, series parallel hybrid systems, examples

Learning Outcomes:

At the end of this unit, the student will be able to

- To know about fuel cell technology of EV **L1**
- To know about basic operation of FCEV **L2**
- To know about characteristics and sizing of EV with suitable example **L3**
- To get exposed to concept of Hybrid Electric Vehicle using fuel cells **L4**
- To know about the comparison of various hybrid EV systems **L5**

UNIT – V: Battery Charging and Control **10 Hrs**

Battery charging: Basic requirements, charger architecture, charger functions, wireless charging, power factor correction. Control: Introduction, modeling of electro mechanical system, feedback controller design approach, PI controllers designing, torque-loop, speed control loop compensation, acceleration of battery electric vehicle

Learning Outcomes:

At the end of this unit, the student will be able to

- To understand about basic requirements of battery charging and its architecture **L1**
- To know about charger functions **L2**
- To get exposed to wireless charging principle **L3**
- To understand about block diagram, modeling of electro mechanical systems of EV **L4**
- To be able to design various compensation requirements **L5**

Text Books:

1. C.C Chan, K.T Chau: Modern Electric Vehicle Technology, Oxford University PressInc., New York 2001.
2. James Larminie, John Lowry, Electric Vehicle Technology Explained, Wiley, 2003.

Reference Books:

1. Electric and Hybrid Vehicles Design Fundamentals, Iqbal Husain, CRC Press 2005.
2. Ali Emadi, Advanced Electric Drive Vehicles, CRC Press, 2015.

Course Outcomes:

At the end of this Course the student will be able to

- To understand and differentiate between conventional and latest trends in Electric Vehicles **L1**
- To know about various configurations in parameters of EV system **L2**
- To know about propulsion and dynamic aspects of EV **L3**
- To understand about fuel cell technologies in EV and HEV systems **L4**
- To understand about battery charging and controls required of EVs **L5**

B.Tech III Year I Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

19AME55a – INTRODUCTION TO HYBRID AND ELECTRICAL VEHICLES

(Open Elective-I)

L	T	P	C
3	0	0	3

Course Objectives: The objectives of the course are to make the students learn about

- Provide good foundation on hybrid and electrical vehicles.
- To address the underlying concepts and methods behind power transmission in hybrid and electrical vehicles.
- Familiarize energy storage systems for electrical and hybrid transportation.
- To design and develop basic schemes of electric vehicles and hybrid electric vehicles.

UNIT I: Electric Vehicle Propulsion And Energy Sources **12 hours**

Introduction to electric vehicles, vehicle mechanics - kinetics and dynamics, roadway fundamentals propulsion system design - force velocity characteristics, calculation of tractive power and energy required, electric vehicle power source - battery capacity, state of charge and discharge, specific energy, specific power, Ragone plot. Battery modeling - run time battery model, first principle model, battery management system- soc measurement, battery cell balancing. Traction batteries - nickel metal hydride battery, Li-Ion, Lipolymer battery.

Learning Outcomes:

At the end of this unit, the student will be able to

- Summaries the concepts of electrical vehicle propulsion and energy sources. L2
- Identify the types of power sources for electrical vehicles L3
- Demonstrate the design considerations for propulsion system. L2
- Solve the problems on tractive power and energy required. L3

UNIT II: Electric Vehicle Power Plant And Drives **10 hours**

Introduction electric vehicle power plants. Induction machines, permanent magnet machines, switch reluctance machines. Power electronic converters-DC/DC converters - buck boost converter, isolated DC/DC converter. Two quadrant chopper and switching modes. AC drives- PWM, current control method. Switch reluctance machine drives - voltage control, current control.

Learning Outcomes:

At the end of this unit, the student will be able to

- Choose a suitable drive scheme for developing electric vehicles depending on resources. L1
- List the various power electronic converters. L1
- Describe the working principle DC/DC converters and buck boost convertor. L2
- Explain about AC Drives. L2

UNIT III: Hybrid And Electric Drive Trains **10 hours**

Introduction hybrid electric vehicles, history and social importance, impact of modern drive trains in energy supplies. Hybrid traction and electric traction. Hybrid and electric drive train topologies. Power flow control and energy efficiency analysis, configuration and control of DC motor drives and induction motor drives, permanent magnet motor drives, switch reluctance motor drives, drive system efficiency.

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JNTUA College of Engineering,
PULIVENDULA - 516 ...

Learning Outcomes:

At the end of this unit, the student will be able to

- Identify the social importance of hybrid vehicles. **L3**
- Discus impact of modern drive trains in energy supplies. **L6**
- Compare hybrid and electric drive trains. **L2**
- Analyze the power flow control and energy efficiency. **L6**

UNIT IV: Electric And Hybrid Vehicles - Case Studies **8 hours**

Parallel hybrid, series hybrid -charge sustaining, charge depleting. Hybrid vehicle case study –Toyota Prius, Honda Insight, Chevrolet Volt. 42 V system for traction applications. Lightly hybridized vehicles and low voltage systems. Electric vehicle case study - GM EV1, Nissan Leaf, Mitsubishi Miev. Hybrid electric heavy duty vehicles, fuel cell heavy duty vehicles

Learning Outcomes:

At the end of this unit, the student will be able to

- List the various electric and hybrid vehicles in the present market. **L1**
- Discuss lightly hybridized vehicle and low voltage systems. **L6**
- Explain about hybrid electric heavy duty vehicles and fuel cell heavy duty vehicles. **L2**

UNIT V: Electric And Hybrid Vehicle Design **8 hours**

Introduction to hybrid vehicle design. Matching the electric machine and the internal combustion engine. Sizing of propulsion motor, power electronics, drive system. Selection of energy storage technology, communications, supporting subsystem. Energy management strategies in hybrid and electric vehicles - energy management strategies- classification, comparison, implementation.

Learning Outcomes:

At the end of this unit, the student will be able to

- Illustrate matching the electric machine and the internal combustion engine. **L2**
- Select the energy storage technology. **L3**
- Select the size of propulsion motor. **L3**
- Design and develop basic schemes of electric and hybrid electric vehicles. **L3**

Text Books:

1. Iqbal Hussein, Electric and Hybrid Vehicles: Design Fundamentals, 2/e, CRC Press, 2003.
2. Amir Khajepour, M. Saber Fallah, Avesta Goodarzi, Electric and Hybrid Vehicles: Technologies, Modeling and Control - A Mechatronic Approach, illustrated edition, John Wiley & Sons, 2014
3. Mehrdad Ehsani, YimiGao, Sebastian E. Gay, Ali Emadi, Modern Electric, Hybrid Electric and Fuel Cell Vehicles: Fundamentals, Theory and Design, CRC Press, 2004.

Reference Books:

1. James Larminie, John Lowry, Electric Vehicle Technology Explained, Wiley, 2003.
2. John G. Hayes, G.Abas Goodarzi, Electric Powertrain: Energy Systems, Power Electronics and Drives for Hybrid, Electric and Fuel Cell Vehicles, 1/e, Wiley-Blackwell, 2018.

Course Outcomes:

At the end of this Course the student will be able to

- Explain the working of hybrid and electric vehicles. **L2**
- Choose a suitable drive scheme for developing hybrid and electric vehicles depending on resources. **L3**
- Develop the electric propulsion unit and its control for application of electric vehicles. **L3**
- Choose proper energy storage systems for vehicle applications. **L3**
- Design and develop basic schemes of electric vehicles and hybrid electric vehicles. **L3**

B.Tech III Year I Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

19AME55b – RAPID PROTOTYPING

(Open Elective-I)

L	T	P	C
3	0	0	3

Course Objectives: The objectives of the course are to make the students learn about

- Familiarize techniques for processing of CAD models for rapid prototyping.
- Explain fundamentals of rapid prototyping techniques.
- Demonstrate appropriate tooling for rapid prototyping process.
- Focus Rapid prototyping techniques for reverse engineering.
- Train Various Pre – Processing, Processing and Post Processing errors in RP Processes

UNIT I **12 Hours**

Introduction: Introduction to Prototyping, Traditional Prototyping Vs. Rapid Prototyping (RP), Need for time compression in product development, Usage of RP parts, Generic RP process, Distinction between RP and CNC, other related technologies, Classification of RP.

RP Software: Need for RP software, MIMICS, Magics, SurgiGuide, 3-matic, 3D-Doctor, Simplant, Velocity2, VoXim, SolidView, 3DView, etc., software, Preparation of CAD models, Problems with STL files, STL file manipulation, RP data formats: SLC, CLI, RPI, LEAF, IGES, HP/GL, CT, STEP.

Learning Outcomes:

At the end of this unit, the student will be able to

- Explain prototyping process. **L2**
- Classify different Rapid Prototyping Processes. **L2**
- Summarize RP software's and Represent a 3D model in STL format, other RP data formats. **L2**

UNIT II **10 Hours**

Solid and Liquid Based RP Systems: Stereolithography (SLA): Principle, Process, Materials, Advantages, Limitations and Applications. Solid Ground Curing (SGC): Principle, Process, Materials, Advantages, Limitations, Applications. Fusion Deposition Modeling (FDM): Principle, Process, Materials, Advantages, Limitations, Applications. Laminated Object Manufacturing (LOM): Principle, Process, Materials, Advantages, Limitations, Applications.

Learning Outcomes:

At the end of this unit, the student will be able to

- Explain the principles, advantages, limitations and applications of Solid and Liquid based AM systems. **L2**
- Identify the materials for Solid and Liquid based AM systems. **L2**

UNIT III **8 Hours**

Powder Based RP Systems: Principle and Process of Selective Laser Sintering (SLS), Advantages, Limitations and Applications of SLS, Principle and Process of Laser Engineered Net Shaping (LENS), Advantages, Limitations and Applications of LENS, Principle and Process of Electron Beam Melting (EBM), Advantages, Limitations and Applications of EBM.

Other RP Systems: Three Dimensional Printing (3DP): Principle, Process, Advantages, Limitations and Applications. Ballastic Particle Manufacturing (BPM): Principle, Process, Advantages, Limitations, Applications. Shape Deposition Manufacturing (SDM): Principle, Process, Advantages, Limitations, Applications.

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PULIVENDULA - 516 390.

Learning Outcomes:

At the end of this unit, the student will be able to

- Explain the principles, advantages, limitations and applications of powder based AM systems. L2
- Understand the principles, advantages, limitations and applications of other Additive Manufacturing Systems such as 3D Printing, Ballistic Particle Manufacturing and Shape Deposition Modeling. L2

UNIT IV **8 hours**

Rapid Tooling: Conventional Tooling Vs. Rapid Tooling, Classification of Rapid Tooling, Direct and Indirect Tooling Methods, Soft and Hard Tooling methods.

Reverse Engineering (RE): Meaning, Use, RE – The Generic Process, Phases of RE Scanning, Contact Scanners and Noncontact Scanners, Point Processing, Application Geometric Model, Development.

Learning Outcomes:

At the end of this unit, the student will be able to

- Classify Rapid Tooling methods. L2
- Explain the concepts of reverse engineering and scanning tools. L2

UNIT V **8 Hours**

Errors in RP Processes: Pre-processing, processing, post-processing errors, Part building errors in SLA, SLS, etc.

RP Applications: Design, Engineering Analysis and planning applications, Rapid Tooling, Reverse Engineering, Medical Applications of RP.

Learning Outcomes:

At the end of this unit, the student will be able to

- Identify various Pre – Processing, Processing and Post – Processing errors in RP processes. L2
- Apply of RP in engineering design analysis and medical applications. L3

Text Books:

1. Chua C.K., Leong K.F. and Lim C.S., Rapid Prototyping: Principles and Applications, 2/e Edition, World Scientific Publishers, 2003.
2. Ian Gibson, David W. Rosen, Brent Stucker, Additive Manufacturing Technologies: Rapid Prototyping to Direct Digital Manufacturing, 1st Edition, Springer, 2010.
3. Rafiq Noorani, Rapid Prototyping: Principles and Applications in Manufacturing, John Wiley & Sons, 2006.

Reference Books:

1. Liou W. Liou, Frank W., Liou, Rapid Prototyping and Engineering Applications: A Tool Box for Prototype Development, CRC Press, 2007.
2. Pham D.T. and Dimov S.S., Rapid Manufacturing; The Technologies and Application of RPT and Rapid tooling, Springer, London 2001.
3. Gebhardt A., Rapid prototyping, Hanser Gardener Publications, 2003.
4. Hilton P.D. and Jacobs P.F., Rapid Tooling: Technologies and Industrial Applications, CRC Press, 2005.

Course Outcomes:

At the end of this Course the student will be able to

- Use techniques for processing of CAD models for rapid prototyping. L3
- Understand and apply fundamentals of rapid prototyping techniques. L3
- Use appropriate tooling for rapid prototyping process. L3
- Use rapid prototyping techniques for reverse engineering. L3
- Identify Various Pre – Processing, Processing and Post Processing errors in RP processes. L3

B.Tech III Year I Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

19AME55c – DESIGN FOR MANUFACTURING AND ASSEMBLY

(Open Elective – I)

L	T	P	C
3	0	0	3

Course Objectives: The objectives of the course are to make the students learn about

- Discuss various factors influencing the manufacturability of components and use of tolerances in manufacturing
- Explain various considerations in casting, welding, forging and machining processes.
- Demonstrate on the design factors dependent on the assembly methods.
- Teach the principles and rules of design for assembly.
-

UNIT I: INTRODUCTION TO DFM **12 Hours**

Significance of design, qualities of a designer and Design factors, Systematic working plan, The engineering problem to be solved, The basic design, Factors influencing choice of materials and the factors influencing manufacturing Process Capability Mean, Median, Variance, Mode, Standard Deviation, Normal Distribution and Process capability metrics, Process Capability, Tolerances-symbols and definition, Tolerances relevant to manufacturing, assembly and material condition, Tolerance stack-effects on assembly with examples, Methods of eliminating tolerance stack with examples.

Learning Outcomes:

At the end of this unit, the student will be able to

- Explain the desirable qualities of a designer. **L2**
- List various factors influencing the choice of materials. **L1**
- Recall the concepts of Mean, Median, Variance and Mode. **L1**
- Discuss the methods of eliminating tolerance stack with examples. **L2**

UNIT II: FORM DESIGN-CASTING AND WELDING **10 Hours**

Influence of loading, Materials, Production methods on form design, Casting considerations, Grey iron castings, Steel castings, Aluminum Casting Requirements and rules for casting, Form design of pressure die castings, Welding considerations welding Processes, Requirements and rules for welding, Redesign of components for casting-pattern-mould- Parting Line, Redesign of components for welding, Case studies in form design-simple problems in form design.

Learning Outcomes:

At the end of this unit, the student will be able to

- Recall the function of various components (pattern, mould, parting line, etc) in casting **L1**
- Explain the various production methods on form design. **L2**
- Understand the requirements and rules for casting and welding. **L2**
- Make use of case studies to understand redesign of the components. **L3**

UNIT III: FORM DESIGN-FORGING AND MACHINING **8 Hours**

Forging considerations hammer forging drop forging, Requirements and rules for forging, Choice between casting, forging and welding, Machining considerations Drills, Milling-Keyways, Dwells and Dwelling Procedure Countersunk Head screws Requirements and rules for Machining considerations and Reduction of machined areas Redesign of components for Forging, Redesign of components for Machining, Simplification by separation and Simplification by amalgamation, Case studies.

Learning Outcomes:

At the end of this unit, the student will be able to

- Choose the manufacturing process depending upon the shape and size of the product. **L3**

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- Classify various machining processes L2
- Discuss the rules and design considerations of forging L2
- Recall the redesign concepts of forging and machining. L1

UNIT IV: INTRODUCTION TO DFA **8 hours**

DFA, Introduction, Distinction between assembly methods and processes, Factors Determining assembly methods and processes, Success and failure-Causes of failure, Product Design factors independent of methods and processes , Introduction-Number of operations in the product, Assembly Precedence, Standardization, Design factors dependent on Assembly methods , Introduction-Single Station Assembly Line Assembly, Hybrid Systems, Manual Assembly lines, Flexible Assembly lines, Design factors dependent on Assembly processes, Factors Influencing Production rate to Facility Ratio- Parts Presentation, Manual Assembly, Dedicated Assembly, Transportation, Separation and Orientation- Flexible Assembly, Gripping, Transferring, Part Insertion, Failures and Error Recovery

Learning Outcomes:

At the end of this unit, the student will be able to

- Illustrate manual assembly lines and flexible assembly lines. L2
- Explain the product design factors independent of methods and processes L2
- Discuss the importance of standardization in design for assembly. L2
- List the design factors that are dependent and independent on the Assembly processes. L1

UNIT V: DESIGN FOR ASSEMBLY METHODS **8 Hours**

Approaches to design for assembly and Introduction, Approaches based on design principles and rules, Example DFA method using Design Principles, DFA Systems employing Quantitative evaluation procedures, IPA Stuttgart Method, DFA Methods employing a Knowledge based approach, Knowledge representation Computer Aided DFA methods, Part model, Feature, Processing. Assembly measures like Qualitative and Quantitative measures, Boothroyd and Dewhurst DFA method. Redesign of a simple product , Small consumer product and Fastener solution redesign using symmetry, Case Studies Designing of a disposal valve, Design of a lever-arch file mechanism

Learning Outcomes:

At the end of this unit, the student will be able to

- Explain various approaches to design for assembly. L2
- Demonstrate on DFA systems employing quantitative evaluation procedures. L2
- Discuss DFA methods employing a knowledge based approach. L2
- Understand the qualitative and quantitative measures in assembly. L2

Text Books:

1. Harry Peck., "Design for Manufacture", Pittman Publications, 1983.
2. Alan Redford and chal, "Design for Assembly-Principles and Procedures", McGraw Hill International Europe, London, 1994.

Reference Books:

1. Robert Matousek, "Engineering Design A Systematic Approach", Blackie &sons Ltd., 1963
2. James G.Bralla, "Hand Book of Product design for Manufacturing", McGraw Hill Co., 1986
3. Swift, K.G., "Knowledge Based Design for Manufacture", Kogan Page Ltd., 1987

Course Outcomes:

At the end of this Course the student will be able to

- Recall the importance of Design for Manufacturing and Assembly. L1
- Explain the form design factors with the help of Case study. L2
- Evaluate how the factor of redesign affects the product life cycle. L5
- Make use of DFA methods proposed by Boothroyd and Dewhurst. L3

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PULIVENDULA - 516 390.

B.Tech III Year I Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

19AME55d – POWER PLANT OPERATION AND CONTROL

(Open Elective-I)

L	T	P	C
3	0	0	3

Course Objectives: The objectives of the course are to make the students learn about

- Familiarize with various methods of power generation.
- Outline the working components of power plants.
- Expose the students measuring of various controllable and uncontrollable factors in power plants.
- Explain the concepts of boiler and turbine control.

UNIT I : OVERVIEW OF POWER GENERATION **12 Hours**

Survey of methods of power generation: Hydro, thermal, nuclear, solar and wind power - Importance of instrumentation in power generation - Thermal power plant - Building blocks - Combined cycle systems - Combined heat and power system - sub critical and supercritical boilers.

Learning Outcomes:

At the end of this unit, the student will be able to

- List the various types of power plants. **L1**
- Illustrate the importance of instrumentation in power generation. **L4**
- Compare subcritical and supercritical boilers. **L2**

UNIT II: MEASUREMENTS IN POWER PLANTS **10 Hours**

Measurement of feed water flow, air flow, steam flow and coal flow – Drum level measurement – Steam pressure and temperature measurement – Turbine speed and vibration measurement – Flue gas analyzer – Fuel composition analyzer

Learning Outcomes:

At the end of this unit, the student will be able to

- Describe turbine speed and vibration measurements. **L2**
- Determine the steam flow and coal flow in power plants. **L3**
- Appraise the importance of flue gas and fuel composition analyzer in power plants. **L5**
- Illustrate the various controllable and uncontrollable factors that can be measure in power plants. **L2**

UNIT III : BOILER CONTROL – I **8 Hours**

Combustion of fuel and excess air – Firing rate demand – Steam temperature control – Control of deaerator– Drum level control – Single, two and three element control – Furnace draft control – implosion – flue gas dew point control – Trimming of combustion air – Soot blowing.

Learning Outcomes:

At the end of this unit, the student will be able to

- List the various boiler control methods. **L1**
- Describe the steam temperature control and drum level control. **L2**
- Demonstrate furnace draft control and drum level control. **L2**

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PULIVENDULA - 516 390.

UNIT IV : BOILER CONTROL – II **8 hours**

Burners for liquid and solid fuels – Burner management – Furnace safety interlocks – Coal pulverizer control – Combustion control for liquid and solid fuel fired boilers – air/fuel ratio control – fluidized bed boiler – Cyclone furnace.

Learning Outcomes:

At the end of this unit, the student will be able to

- Identify the burners for liquid and solid fuels. L3
- Describe the working principle of coal pulverizer control. L2
- Explain combustion control for liquid and solid fuel fired boiler. L2

UNIT V :CONTROL OF TURBINE **8 Hours**

Types of steam turbines – impulse and reaction turbines – compounding – Turbine governing system – Speed and Load control – Transient speed rise – Free governor mode operation – Automatic Load Frequency Control – Turbine oil system – Oil pressure drop relay – Oil cooling system – Turbine run up system.

Learning Outcomes:

At the end of this unit, the student will be able to

- List the various types of steam turbines. L1
- Compare impulse and reaction turbines. L2
- Describe turbine governing system for speed and load control. L2
- Explain about oil cooling system in turbine. L2

Text Books:

1. Sam Dukelow, Control of Boilers, Instrument Society of America, 1991.
2. Everett Woodruff , Herbert Lammers, Thomas Lammers, Steam Plant Operation,9th Edition McGraw Hill, 2012.
3. Rajput R.K. A Text book of Power plant Engineering. 5th Edition, Lakshmi Publications, 2013.

Reference Books:

1. Liptak B.G., Instrumentation in Process Industries, Chilton Book Company, 2005.
2. Jain R.K., Mechanical and Industrial Measurements, Khanna Publishers, New Delhi, 1999.
3. P.K.Nag, Powerplant Engineering, Tata McGraw-Hill Education, 3rd edition, 2007.
4. Tamilmani, Power plant instrumentation, Sams Publishers, 2011.
5. Krishnaswamy.K and Ponnibala.M., Power Plant Instrumentation, PHI Learning Pvt.Ltd., New Delhi, 2011.

Course Outcomes:

At the end of this Course the student will be able to

- Outline sources of energy for various power plants. L2
- Explain boiler and turbine control. L2
- Describe working components of a steam power plant. L2
- Illustrate the working mechanism of Diesel and Gas turbine power plants. L2
- Summarize types of measuring parameters for controlling the power plant. L2
- Demonstrate the working principle of nuclear power plants. L4

B.Tech III Year I Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

19AME55e – SMART MATERIALS

(Open Elective-I)

L	T	P	C
3	0	0	3

Course Objectives: The objectives of the course are to make the students learn about

- Familiarize the smart materials and its role in developing intelligent systems.
- Introduce the students with HBLS and LBHS smart materials.
- Expose the students in smart systems development and uses.
- Understand the working principle of smart actuators and smart sensors.

UNIT I **12 Hours**

Introduction to Smart Materials: What is Intelligence? Artificial intelligence Vs. embedded Intelligence, Definition of smart material, need for smart materials, classifications of smart systems, components of a smart systems, smart system applications, the role of Smart Materials in developing Intelligent Systems and Adaptive Structures.

Learning Outcomes:

At the end of this unit, the student will be able to

- Recall what is intelligence. **L1**
- Define smart materials. **L1**
- Describe the role of smart materials in development of intelligent systems and adaptive structures. **L2**
- Illustrate the applications of smart systems. **L2**

UNIT II: High bandwidth - Low strain generating (HBLS) Smart Materials **10 Hours**

Piezoelectric Materials – constitutive relationship, electromechanical coupling coefficients, piezoelectric constants, piezoceramic materials, variation of coupling coefficients in hard and soft piezoceramics, polycrystalline vs single crystal piezoelectric materials, polyvinyldene fluoride, piezoelectric composites.

Magnetostrictive Materials – constitutive relationship, magneto-mechanical coupling coefficients, Joule Effect, Villari Effect, Matteuci Effect, Wiedemann effect, Giant magnetostriction in Terfenol-D, Terfenol-D particulate composites, Galfenol and Metglas materials.

Learning Outcomes:

At the end of this unit, the student will be able to

- Describe the constitutive relationship of piezoelectric materials. **L2**
- Compare polycrystalline and single crystal piezeoelectric materials. **L2**
- Explain concepts of Joule effect, Villari effect, Matteuci effect, Wiedemann effect. **L2**
- Discuss Galfenol and Metglas materials. **L6**

UNIT III **8 Hours**

Low bandwidth - High strain generating (LBHS) materials: Shape Memory Alloys (SMA) – Introduction, Phenomenology, Influence of stress on characteristic temperatures, Modelling of shape memory effect. Vibration control through shape memory alloys. Design considerations, multiplexing embedded NiTiNOL actuators. Electro-active Polymers (EAP)- Introduction, Phenomenology, Influence of stress on characteristic temperatures

Learning Outcomes:

At the end of this unit, the student will be able to

- List various types of LBHS smart materials. **L1**
- Identify the influence of stress on characteristic temperatures in SMA and EAP. **L3**

- Explain the concept of vibration control through shape memory alloys. **L2**
- Discuss design considerations of shape memory alloy. **L6**

UNIT IV: Smart actuators **8 hours**

Based on HBLS smart materials: Piezoelectric Actuators – Induced Strain actuation model, Unimorph and Bimorph Actuators, Actuators embedded in composite laminate, Impedance matching in actuator design, Feedback Control, Pulse Drive, Resonance Drive. Magnetostrictive Actuators – Magnetostrictive Mini Actuators, Thermal instabilities, Discretely distributed actuation, Manetostrictive Composites.
Based on LBHS Smart Materials - Shape Memory Alloy based actuators for Shape Control, Electro-active Polymers for Work-Volume Generation

Learning Outcomes:
At the end of this unit, the student will be able to

- Recall working principle of actuators. **L1**
- Explain impedance matching in actuator design, feedback control, pulse drive and resonance. **L2**
- Describe the working principle of Piezoelectric Actuators & Magnetostrictive Actuators. **L2**
- Discuss the concepts of actuators based on HBLS and LBHS. **L6**

UNIT V: Smart sensors **8 Hours**

Sensors based on HBLS Smart Materials - Piezoelectric Sensors Magnetostrictive Sensors Techniques of Self Sensing MEMS Sensors.

Sensors based on LBHS Smart Materials - EAP based sensors, SMA based encoders, Optical Fibre based Sensing.

Learning Outcomes:
At the end of this unit, the student will be able to

- Select the type of sensor required for smart systems. **L1**
- Explain techniques of self sensing MEMS sensors. **L2**
- Discuss EPA based and SMA based sensors. **L6**
- Explain optical based sensing system. **L2**

Text Books:

- M.V. Gandhi, B.D. Thompson" Smart Materials and Structures" Springer Science & Business Media, 31-May-1992.

Reference Books:

1. Brian Culshaw, Smart Structures and Materials, Artech House, 2000.
2. Gauenzi, P., Smart Structures, Wiley, 2009.
3. Cady, W. G., Piezoelectricity, Dover Publication

Course Outcomes:
At the end of this Course the student will be able to

- Describe the role of smart materials in development of intelligent systems and adaptive structures. **L2**
- Compare polycrystalline and single crystal piezoelectric materials. **L2**
- Identify the influence of stress on characteristic temperatures in SMA and EAP. **L3**
- Explain techniques of self sensing MEMS sensors. **L2**

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PULIVENDULA - 516 390.

B.Tech III Year I Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

19AME55f – SUPPLY CHAIN MANAGEMENT

(Open Elective-I)

L	T	P	C
3	0	0	3

Course Objectives: The objectives of the course are to make the students learn about

- Explain the basics of supply chain management.
- Familiarize inventory management techniques and models to ensure EOQ batch size under risk management.
- Demonstrate various distribution strategies for shipment of products.
- Focus on evaluating of strategic alliance partners and understanding of RDBMS.

UNIT I **12 Hours**

Understanding the supply chain: What is SCM? Why SCM? The Complexity, Key issues in SCM Logistics network - Introduction, Data Collection, Transportation, Ware house Management, Strategic location of ware houses, Demand forecasting, Role of aggregate planning, MRP, ERP, Managing variability, Key features of Network configuration.

Learning Outcomes:

At the end of this unit, the student will be able to

- Explain the strategic importance of SCM and how operations relate to other business functions. L2
- Summarize working knowledge of the concepts and methods of SCM L2
- Apply concepts for continuous improvement for practical problems L3

UNIT II **8 Hours**

Inventory management: Concepts of Materials Management, Economic lot size model, Effect of Demand uncertainly, Fixed order costs, Variable lead frames, Inventory under certainly & uncertainty, Risk Management

Learning Outcomes:

At the end of this unit, the student will be able to

- Explain why companies keep inventory and costs of inventory for inventory decisions. L2
- Outline the key elements and relationship with customer service. L2
- Determine the appropriate reorder point in a continuous inventory system based on a target service level. L3
- Apply the order quantity estimate for a periodic inventory system. L3

UNIT III **8 Hours**

Distribution strategies: Introduction, Centralized vs Decentralized control, Direct shipment, Cross Docking, Push based vs Pull based supply chain.

Learning Outcomes:

At the end of this unit, the student will be able to

- Discuss outsourcing as a strategic decision. L3
- Classify the distribution strategies, systems and processes L2
- Analyze issues and trends in the supply chain L4

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PULIVENDULA - 516 390.

UNIT IV **8 hours**

Strategic alliances: Third party Logistics (3PL), Retailer – supplier relationship issues, requirements, success & failures, Distributor integration Types & issues.

Learning Outcomes:

At the end of this unit, the student will be able to

- Explain the third party logistics L2
- Develop retailer supplier relationship issues L2
- Compare distribution integration types and issues L2

UNIT V **10 hours**

MIS & SCM: Relational Data Base Management (RDBMS), System Architecture, Communications, and Implementation of ERP, Decision support systems for SCM: Analytical tools, Presentation tools, Smooth production flow Current issues & directing challenges for future, e-Commerce strategies and world class supply chain management.

Learning Outcomes:

At the end of this unit, the student will be able to

- Interpret the basic modes of RDBMS for communication and ERP implementation. L5
- Identify support systems for supply chain management L3
- Explain the analytical and presentation tools L2
- Outline E-commerce strategies for world class SCM L2

Text Books:

1. Sunil Chopra, Peter Meindl, Supply Chain Management: Strategy, Planning, and Operation, 4/e, Pearson, 2010.
2. David N. Burt, Donald W. Dobler , World Class Supply Management: The Key to Supply Chain Management, 2/e, McGraw-Hill/Irwin, 2003

Reference Books:

1. John Joseph Coyle, Edward J. Bardi, C. John Langley, The Management of Business Logistics: A Supply Chain Perspective, South-Western/Thomson Learning, 2003.
2. Upendra Kachru, Logistics and Supply Chain Management, Excel Books, 2009.

Course Outcomes:

At the end of this Course the student will be able to

- Apply the concepts of supply chain management for demand forecasting. L3
- Make use of SCM and inventory management for procurement. L3
- Analyze the shipment activities and related issues. L4
- Build third party alliances. L5
- Adapt the RDBMS data for communications and analyzing future challenges and understand e-commerce strategies. L6

B.Tech III Year I Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

19ACS55a- OOPS CONCEPTS THROUGH JAVA

Open Elective-1

L	T	P	C
3	0	0	3

Course Objectives:

- Study the syntax, semantics and features of Java Programming Language
- Study the Object Oriented Programming Concepts of Java Programming language
- Learn the method of creating Multi-threaded programs and handle exceptions
- Learn Java features to create GUI applications & perform event handling

UNIT – I: INTRODUCTION **8hrs**

Introduction to Java: The key attributes of object oriented programming, simple program, The Java keywords, Identifiers, Data types and operators, Program control statements, Arrays, Strings, String Handling

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand the basics of computer graphics, different graphics systems and applications of computer graphics. **L2**
- Discuss various algorithms for scan conversion and filling of basic objects and their comparative analysis. **L2**

UNIT – II: CLASSES **8hrs**

Classes: Classes, Objects, Methods, Parameters, Constructors, Garbage Collection, Access modifiers, Pass Objects and arguments, Method and Constructor Overloading, Understanding static, Nested and inner classes.

Learning Outcomes:

At the end of this unit, the student will be able to

- Use of geometric transformations on graphics objects and their application in composite form. **L3**
- Extract scene with different clipping methods and its transformation to graphics display device. **L3**

UNIT – III: INHERITANCE **8hrs**

Inheritance – Basics, Member Access, Usage of Super, Multi level hierarchy, Method overriding, Abstract class, Final keyword.

Learning Outcomes:

At the end of this unit, the student will be able to

- Explore projections and visible surface detection techniques for display of 3D scene on 2D screen. **L4**
- Render projected objects to naturalize the scene in 2D view and use of illumination models . **L4**

UNIT – IV: INTERFACES **7 Hrs**

Interfaces – Creating, Implementing, Using, Extending, and Nesting of interfaces.

Packages – Defining, Finding, Member Access, Importing.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand the basics of Multimedia basics, different graphics systems and applications of computer graphics. **L3**
- Discuss various multimedia data structures. **L3**

UNIT – V: EXCEPTION HANDLING

Exception handling: Hierarchy, Fundamentals, Multiple catch clauses, subclass exceptions, Nesting try blocks, Throwing an exception, Using Finally and Throws, Built-in exceptions, User-defined exceptions.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand the basics of Multimedia Authoring systems. **L5**
- Understand the how videos are placed. **L5**

Text Books:

1. "Java Fundamentals - A Comprehensive Introduction", Herbert Schildt and Dale Skrien, Special Indian Edition, McGrawHill, 2013.
2. "Java The Complete Reference" Herbert Schildt, 8th Edition, 2011, Oracle press, TataMcGraw-Hill.
3. "Java – How to Program", Paul Deitel, Harvey Deitel, PHI.

Reference Books:

1. "Programming with Java" T.V.Suresh Kumar, B.Eswara Reddy, P.Raghavan Pearson Edition.
2. "Core Java", Nageswar Rao, Wiley Publishers.
3. "Thinking in Java", Bruce Eckel, Pearson Education.
4. "A Programmers Guide to Java SCJP", Third Edition, Mughal, Rasmussen, Pearson.
5. "Head First Java", Kathy Sierra, Bert Bates, O'Reilly
6. "SCJP – Sun Certified Programmer for Java Study guide" – Kathy Sierra, Bert Bates, McGrawHill.
7. "Java in Nutshell", David Flanagan, O'Reilly
8. "Core Java : Volume I – Fundamentals, Cay S. Horstmann, Gary Cornell, The Sun Micro Systems Press.

Course Outcomes:

At the end of this Course the student will be able to

- Gain knowledge of client-side scripting, validation of forms and AJAX programming. **L3**
- Understand server-side scripting with PHP language. **L4**
- Understand what XML is and how to parse and use XML Data with Java. **L5**
- To introduce Server-side programming with Java Servlets and JSP.

III B.Tech I SEMESTER

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA
19ACS55b- INTRODUCTION TO INTERNET OF THINGS
Open Elective-I

L	T	P	C
3	0	0	3

Course Objectives:

- Students will be explored to the interconnection and integration of the physical world and the cyber space. They are also able to design & develop IOT Devices.

UNIT – 1: INTRODUCTION

Introduction – Characteristics-Physical Design - Protocols – Logical Design – Enabling technologies – IoT Levels – Six Levels of IoT - Domain Specific IoTs.**Learning Outcomes:**

At the end of this unit, the student will be able to L2

- Able to understand the application areas of IOT ·
- Able to realize the revolution of Internet in Mobile Devices, Cloud & Sensor Networks · L3

UNIT – II: M2M, IoT vs M2M

M2M, IoT vs M2M, SDN and NFV for IoT, IOT system Management with NETCONF-YANG.

. **Learning Outcomes:**

At the end of this unit, the student will be able to L2

- Able to understand the application areas of IOT ·
- Able to realize the revolution of Internet in Mobile Devices, Cloud & Sensor Networks · L3

UNIT – III: IOT SYSTEM MANAGEMNT

IoT Systems Management – IoT Design Methodology – Specifications Integration and Application Development.

Learning Outcomes:

At the end of this unit, the student will be able to L2

- Able to understand the application areas of IOT ·
- Able to realize the revolution of Internet in Mobile Devices, Cloud & Sensor Networks · L3

UNIT – IV: SENSORS

Sensors- Types of sensor nodes, Internet communications, IP addresses, MAC Address, TCP and UDP Ports, Application layer protocols

Learning Outcomes:

At the end of this unit, the student will be able to L2

- Able to understand the application areas of IOT ·
- Able to realize the revolution of Internet in Mobile Devices, Cloud & Sensor Networks · L3

UNIT – V: IOT APPLICATIONS

IOT application for industry-Future factory concepts, Brownfield IoT, Smart objects, Smart applications, Study of existing IoT platforms/middleware, IoT- A, Hydra etc.

Srad

Learning Outcomes:

At the end of this unit, the student will be able to

- Able to understand the application areas of IOT · **L2**
- Able to realize the revolution of Internet in Mobile Devices, Cloud & Sensor Networks · **L3**

Text Books:

1. Arshdeep Bahga, Vijay Madisetti, "Internet of Things – A Hands-on Approach", Universities Press, 2015.

Reference Books:

1. Manoel Carlos Ramon, "Intel® Galileo and Intel® Galileo Gen 2: API Features and Arduino Projects for Linux Programmers", Apress, 2014.
2. Marco Schwartz, "Internet of Things with the Arduino Yun", Pack Publishing, 2014.
3. *Simon Monk, "Programming the Raspberry Pi: Getting Started with Python"*, McGraw-Hill, *2013.*
4. Charalampos Doukas, "Building Internet of Things With the Arduino", Second Edition, 2012.
5. Dr. John Bates, "Thingalytics: Smart Big Data Analytics for the Internet of Things", Software AG Publisher, 2015.

Course Outcomes:

At the end of this Course the student will be able to

Introduction to computer graphics

Able to understand the application areas of IOT · **L2**

Able to realize the revolution of Internet in Mobile Devices, Cloud & Sensor Networks · **L3**

Able to understand building blocks of Internet of Things and characteristics **L4**

III B.Tech I SEMESTER

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

19ACS55c- INTRODUCTION TO OPERATING SYSTEMS

Open Elective-1

L	T	P	C
3	0	0	3

Course Objectives:

- To make the students understand the basic operating system concepts such as processes, threads, scheduling, synchronization, deadlocks, memory management, file and I/O subsystems and protection.
- To get acquaintance with the class of abstractions afford by general purpose operating systems that aid the development of user applications

UNIT – 1: OPERATING SYSTEMS OVERVIEW

Operating Systems Overview: Operating system functions, Operating system structure, operating systems Operations, protection and security.

Operating System Structure: Operating System Services, User and Operating-System Interface, systems calls, Types of System Calls, system programs.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand what makes a computer system function and the primary PC components. **L2**
- Understand past and current trends in computer technology. **L3**

UNIT – II: THREADS

Threads: overview, Multicore Programming, Multithreading Models, Thread Libraries, Implicit threading, Threading Issues.

CPU Scheduling: Scheduling-Criteria, Scheduling Algorithms, Thread Scheduling.

. **Learning Outcomes:**

At the end of this unit, the student will be able to

- Understand past and current trends in computer technology. **L3**
- Use basic software applications. **L4**

UNIT – III: MEMORY MANAGEMENT

Memory Management: Swapping, contiguous memory allocation, segmentation, paging, structure of the page table.

Deadlocks: System Model, deadlock characterization, Methods of handling Deadlocks, Deadlock prevention, Detection and Avoidance, Recovery from deadlock.

Learning Outcomes:

At the end of this unit, the student will be able to

- Use basic software applications. **L4**
- Add functionality to the exiting operating systems **L5**

UNIT – IV: MASS-STORAGE STRUCTURE

Mass-storage structure: Overview of Mass-storage structure, Disk structure, Disk attachment, Disk scheduling, Swap-space management, RAID structure, Stable-storage implementation.

Learning Outcomes:

Sead

At the end of this unit, the student will be able to

- Add functionality to the exiting operating systems **L5**
- Design new operating systems **L6**

UNIT – V: I/O systems

I/O systems: I/O Hardware, Application I/O interface, Kernel I/O subsystem, Transforming I/O requests to Hardware operations.

Learning Outcomes:

At the end of this unit, the student will be able to

- Add functionality to the exiting operating systems **L5**
- Design new operating systems **L6**

Text Books:

1. Operating System Concepts, Abraham Silberschatz, Peter B. Galvin, Greg Gagne, Ninth Edition, 2012, Wiley.
2. Operating Systems: Internals and Design Principles, Stallings, Sixth Edition, 2009, Pearson Education.

Reference Books:

1. Modern Operating Systems, Andrew S Tanenbaum, Second Edition, PHI.
2. Operating Systems, S.Haldar, A.A.Aravind, Pearson Education.
3. Principles of Operating Systems, B.L.Stuart, Cengage learning, India Edition.
4. Operating Systems, A.S.Godbole, Second Edition, TMH.
5. An Introduction to Operating Systems, P.C.P. Bhatt, PHI.
6. Operating Systems, G.Nutt, N.Chaki and S.Neogy, Third Edition, Pearson Education.
7. Operating Systems, R.Elmasri, A,G.Carrick and D.Levine, Mc Graw Hill.

Course Outcomes:

At the end of this Course the student will be able to

- Understand what makes a computer system function and the primary PC components. **L2**
- Understand past and current trends in computer technology. **L3**
- Use basic software applications. **L4**
- Add functionality to the exiting operating systems **L5**
- Design new operating systems **L6**

OPEN-I

B.Tech III Year I Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

19AHS13-ENGLISH LANGUAGE SKILLS LAB

(Common to EEE, ECE & CSE)

L	T	P	C
0	0	3	1.5

Course Objectives:

- Students will cultivate the habit of reading passages from the computer monitor. Thus providing them with the required facility to face computer based competitive exams like GRE, TOEFL and GMAT etc.
- students will be trained to use language effectively to face interviews, group discussions, public speaking

UNIT – I: **12Hrs**

1. Phonetics for listening comprehension of various accents -2
2. Formal Presentations using PPT slides without Graphic Elements.
3. Paraphrasing.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand different accents spoken by native speakers of English **L1**
- Make formal structured presentations on general topics using PPT slides without graphical elements **L2**

UNIT – II: **12Hrs**

1. Debate – 2 (Following Argument).
2. Listening to short speeches/ short stories for note-making and summarizing.
3. E-mail Writing.

Learning Outcomes:

At the end of this unit, the student will be able to

- Participate in formal discussions and speak clearly on a specific topic using suitable discourse markers. **L1**
- Make formal structured presentations on academic topics using ppt slides with relevant graphical elements. **L2**

UNIT – III **12Hrs**

1. Listening for Discussions.
2. Group Discussions.
3. Writing Persuasive/argumentative essays on general topics.

Learning Outcomes:

At the end of this unit, the student will be able to

- Participate in group discussions using appropriate conventions and language strategies. **L1**
- Produce logically coherent persuasive/argumentative essays. **L2**

UNIT – IV **12Hrs**

1. Reviewing film/book.
2. Group Discussions – reaching consensus in Group Work.
3. Resume Writing – Cover Letter – Applying for Internship.

Learning Outcomes:

At the end of this unit, the student will be able to

- Express thoughts and ideas with acceptable accuracy and fluency with a view to reach consensus in group discussions **L1**
- Prepare a CV and write a cover letter to seek internship/job **L2**

1/10/21

UNIT – V **12Hrs**

1. Writing Project Reports.
2. Editing Short Texts.
3. Answering FAQs in Interviews.

Learning Outcomes:

At the end of this unit, the student will be able to

- Collaborate with a partner to make effective presentations. **L1**
- Understand the structure and produce an effective project report. **L2**

Suggested Software

- Walden Infotech English Language Communication Skills.
- iTell- Orell Digital Language Lab.
- Digital Teacher.
- LES(Learn English Select) by British council.
- TOEFL & GRE (KAPLAN, AARCO & BARRONS, USA, Cracking GRE by CLIFFS).
- DELTA's key to the Next Generation TOEFL Test: Advanced Skills Practice.
- Lingua TOEFL CBT Insider, by Dreamtech.
- English Pronunciation in Use (Elementary, Intermediate, Advanced)CUP.
- Cambridge Advanced Learners' English Dictionary withCD.

Reference Books:

1. Meenakshi Raman &Sangeeta Sharma, "Technical Communication" O U Press2009.
2. Barron's Books on TOEFL/GRE/GMAT/CAT/IELTS /DELTA/Cambridge University Press.2012
3. Butterfield Jeff, "Soft Skills for Everyone", Cengage Publications,2011.
4. "Practice Psychometric Tests": How to familiarize yourself with genuine recruitment tests, 2012.
5. David A McMurrey & Joanne Buckely "Handbook for Technical Writing" CENGAGE Learning2008.
6. "A Textbook of English Phonetics for Indian Students", 2nd Edition, T.Balasubramanyam. (Macmillan),2012.
7. "A Handbook for English Laboratories", E. Suresh Kumar, P. Sreehari, Foundation Books, 2011.
8. Sambaiah.M. ***Technical English***, Wiley publishers India. New Delhi. 2014.

Course Outcomes:

At the end of this Course the student will be able to

- Remember and understand the different aspects of the English language proficiency with emphasis on LSRW skills. **L1**
- Apply communication skills through various language learning activities. **L2**
- Analyze the English speech sounds, stress, rhythm, intonation and syllable division for better listening and speaking comprehension. **L3**
- Evaluate and exhibit acceptable etiquette essential in social and professional settings **L4**
- Create awareness on mother tongue influence and neutralize it in order to improve fluency in spoken English. **L5**

B.Tech III Year I Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

19AEC56- DIGITAL COMMUNICATIONS LAB

L	T	P	C
0	0	2	1

Course Objectives: The objectives of the course are to make the students learn about

- To gain an understanding of analog to digital conversion techniques.
- To understand digital modulation, Source coding and Channel coding techniques.
- To analyze different digital communications techniques using MAT Lab tools.

Minimum of Twelve experiments to be conducted (Part A -Eight & Part B - Four)

PART-A: HARDWARE EXPERIMENTS

1. Sampling Theorem – verification.
2. Time division multiplexing.
3. Pulse code modulation.
4. Differential pulse code modulation.
5. Delta modulation.
6. Amplitude shift keying modulation and demodulation.
7. Frequency shift keying modulation and demodulation.
8. Phase shift keying modulation and demodulation.
9. Differential phase shift keying.
10. QPSK modulation and demodulation.
11. Linear Block Code – Encoder and Decoder.
12. Binary Cyclic Code – Encoder and Decoder.
13. Convolution Code – Encoder and Decoder.

PART-B: SOFTWARE EXPERIMENTS

1. Sampling Theorem – verification.
2. Pulse code modulation.
3. Differential pulse code modulation.
4. Delta modulation.
5. Frequency shift keying.
6. Phase shift keying.
7. Differential phase shift keying.
8. QPSK modulation and demodulation

Course Outcomes:

At the end of this Course the student will be able to

- Explain and demonstrate the conversion of analog to digital signals. **L3**
- Grasp the significance of digital modulation, Source coding and Channel coding techniques. **L1**
- Analyze different digital communications techniques using MATLAB tools. **L4**

B.Tech III Year I Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

19AHS17-RESEARCH METHODOLOGY

(Common to EEE, ECE & CSE)

L	T	P	C
3	0	0	0

Course Objectives:

- Students should understand a general definition of research design.
- Students should be able to identify the overall process of designing a research study from its inception to its report.

UNIT – I:

Meaning of Research — Objectives of Research — Types of Research — Research Approaches — Guidelines for Selecting and Defining a Research Problem — research Design — Concepts related to Research Design — Basic Principles of Experimental Design.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand the concept of research and its process. **L1**
- Explain various types of research. **L2**

UNIT – II:

Sampling Design — steps in Sampling Design —Characteristics of a Good Sample Design — Random Sampling Design. Measurement and Scaling Techniques-Errors in Measurement — Tests of Sound Measurement — Scaling and Scale Construction Techniques — Time Seri. Analysis — Interpolation and Extrapolation. Data Collection Methods — Primary Data — Secondary data — Questionnaire Survey and Interviews.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand the concept of sampling and sampling design. **L1**
- Explain various techniques in measurement and scaling. **L2**

UNIT – III:

Correlation and Regression Analysis — Method of Least Squares — Regression on Correlation — Correlation on Determination — Types of Correlations and Their Applications.

Learning Outcomes:

At the end of this unit, the student will be able to

- Know the association of two variables. **L1**
- Understand the importance of correlation and regression. **L2**

UNIT – IV:

Statistical Inference: Tests of Hypothesis — Hypothesis Testing Procedure — Sampling Theory — Sampling Distribution — Chi-square Test — Multi-variate Analysis.

Learning Outcomes:

At the end of this unit, the student will be able to

- Know the statistical inference. **L1**
- Understand the hypothesis testing procedure. **L2**

UNIT – V:

Report Writing and Professional Ethics: Interpretation of Data — Report Writing — Layout of a Research Paper — Techniques of Interpretation- Making Scientific Presentations in Conferences and Seminars — Professional Ethics in Research.

Learning Outcomes:

At the end of this unit, the student will be able to

- Learn about report writing. **L1**
- Understand how to write research paper. **L2**

Text Books:

1. C.R.Kothari, "Research Methodology: Methods and Techniques",2nd edition, New Age International Publishers.
2. A Step by Step Guide for Beginners, "Research Methodology":Ranjit Kumar, Sage Publications.

Reference Books:

1. P.Narayana Reddy and G.V.R.K.Acharyulu, "Research Methodology and Statistical Tools", 1st Edition, Excel Books, New Delhi.
2. Donald R. "Business Research Methods", Cooper & Pamela S Schindler, 9th edition.
3. S C Gupta, "Fundamentals of Statistics", 7th edition Himalaya Publications.
4. Dr. P.Satyanarayana, "a Companion to Literary Research", 1st edition 2020, HSRA publications.

Course Outcomes:

At the end of this Course the student will be able to

- Develop understanding on various kinds of research, objectives of doing research, research process, research designs and sampling. **L1**
- Identify and discuss the complex issues inherent in selecting a research problem, selecting an appropriate research design, and implementing a research project. **L2**
- Have basic knowledge on qualitative research techniques. **L3**
- Identify and discuss the concepts and procedures of sampling, data collection, analysis and reporting. **L4**
- Have basic awareness of data analysis-and hypothesis testing procedures. **L5**

B.Tech III Year II Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

19AEC61- MICROPROCESSORS & MICROCONTROLLERS

L	T	P	C
3	0	0	3

Course Objectives: The objectives of the course are to make the students learn about

- To develop an in-depth understanding of the operation of microprocessors.
- To learn about the architecture of the microprocessor and interfacing DMA controller.
- To understand the parallel and serial data transfer, basic peripherals devices their programming and interfacing techniques.
- To gain knowledge of the concepts of Interrupt of 8086.
- To impart the basic concepts of microcontrollers, programming and interfacing.

UNIT – I:

Introduction: Microprocessor based personal computer system, 8085 Micro Processors: Architecture, Register Organizing, Addressing modes, interrupts, Instruction set, Bus Timings, T state Calculations.

8086 Micro Processors: Programmer's model for 8086, memory organization of 8086, Addressing modes, Instruction set of 8086, Assembly language programming.

Learning Outcomes:

At the end of this unit, the student will be able to

- Gain knowledge on architecture, internal organization, addressing modes and instruction sets of 8085 processors. **L1**
- Understand the architecture, usage of different addressing modes and instruction set of 8086 microprocessor. **L2**

UNIT – II:

Interfacing with 8086 –Part 1: Pin diagram detail of 8086, Minimum and Maximum mode of operations, Bus timing, Memory interface to 8086, DMA Controller: 8257 and 8237 their interfacing to 8086.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand the pin diagram of 8086 and interfacing of memory to 8086. **L2**
- Learn the operation of DMA controller and interfacing to 8086. **L1**

UNIT – III:

Interfacing with 8086 – Part 2: Parallel and serial data transfer methods, I/O interface method, 8255 PPI chip, Interfacing with 7 segment LEDs, Interfacing with keyboards, Interfacing with ADCs, Interfacing with DACs, Interfacing with Stepper Motor.

Learning Outcomes:

At the end of this unit, the student will be able to

- Perform parallel and serial data transfer using 8086 microprocessor. **L3**
- Interface input – output modules and convert analog data to digital data and vice versa. **L4**

UNIT – IV:

Interfacing with 8086 – Part 3: Interrupts of 8086, Programming with DOS and BIOS function calls, 8259 interrupt controller and its interfacing with 8086, cascade mode of operation of 8259.

Learning Outcomes:

At the end of this unit, the student will be able to

- Appreciate the importance and usage of Interrupts of 8086. **L1**
- Gain knowledge on interfacing 8259-interrupt controller and cascade mode of operation of 8259. **L1**

UNIT – V:

Introduction to Microcontrollers : 8051 Micro Controllers: Architecture, Registers Organization, Memory Organization, Pin Description, Connections, I/O Ports, Timers and their modes of operations, Serial Communication - Basics of Serial communication, UART, RS 232 Protocol, 8051 interface to RS 232, 8051 UART Programming, SPI and I^2C implementation on 8051, Addressing Modes, Instruction Set, Assembly directives, Simple assembly software programs with 8051, Interfacing: LEDs, LCDs and switches.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand 8051 microcontroller architecture, internal organization and different modes of operations. **L2**
- Identify the usage of Serial Communication and write assembly software programs with 8051. **L1**

Text Books:

1. Ramesh Gaonkar, "Microprocessor Architecture, Programming and Applications with the 8085", 6th Edition, Penram International Publishing, 2013
2. Douglas V Hall and S. S. SP Rao, "Microprocessors and Interfacing",3rd Edition, Tata McGraw Hill, 2012.
3. M.A. Mazidiand J.C. Mazidi,"Microcontroller and Embedded systems using Assembly & C", 2nd Edition, Pearson Education, 2007.

Reference Books:

1. A.K.Ray andK.M.Bhurchandi, "Advanced Microprocessors and Peripherals",3rd Edition, Tata McGraw Hill, 2006.
2 Kenneth J Ayala, "The 8051 Microcontroller", 3rd Edition, Thomson Delmar Learning, 2004.

Course Outcomes:

At the end of this Course the student will be able to

- Define the basic concepts of microprocessors operation. **L1**
- Describe the architecture of the microprocessor and how to interface DMA controller. **L1**
- Analyze parallel and serial data transfer, and interface basic peripherals devices. **L4**
- Describe the concepts of Interrupts of 8086. **L1**
- Describe the basic concepts of microcontrollers, programming and interfacing. **L1**

B.Tech III Year II Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

19AEC62- DIGITAL SIGNAL PROCESSING

L	T	P	C
3	0	0	3

Course Objectives: The objectives of the course are to make the students learn about

- To learn the basic properties of signal &systems and Discrete Fourier Transform.
- To understand different types of Fast Fourier transform (FFT)algorithms.
- To design simple finite impulse response filters and analyzes their stability.
- To gain knowledge of various structures used in implementation of FIR and IIR filters.
- To grasp the importance and applications of Multirate Digital signal processing

UNIT – I:

Introduction: Review of discrete-time signals and systems–Time domain analysis of discrete-time signals & systems, Frequency domain analysis of discrete-time signals and systems.

Discrete Fourier Transform: Frequency-domain sampling and reconstruction of discrete-time signals, Discrete Fourier Transform (DFT), The DFT as a linear transformation, Relationship of the DFT to other transforms, Properties of DFT, Linear filtering methods based on DFT, Frequency analysis of signals using the DFT.

Learning Outcomes:

At the end of this unit, the student will be able to

- Learn the basics of signals and systems and Discrete Fourier Transform. **L1**
- Represent the signals and systems in both time domain and frequency domain. **L1**

UNIT – II:

Fast Fourier Transform Algorithms: Fast Fourier transforms (FFT)-Radix2 decimation in time and decimation in frequency FFT algorithms, inverse FFT and FFT for composite N, Applications of FFT algorithms – Efficient computation of the DFT of two real sequences, 2N point real sequences, Use of the FFT algorithm in linear filtering and correlation, Quantization errors in the computation of DFT.

Learning Outcomes:

At the end of this unit, the student will be able to

- Apply FFT algorithms for various applications.(L3) **L3**
- Compare the Quantization errors in the computation of DFT.(L2) **L2**

UNIT – III:

Implementation of Filter structures: Overview of Z-transform, Structures for IIR systems – Direct form, Signal flow graphs & Transposed, Cascade form, Parallel form and Lattice structures, Conversion from Lattice structure to direct form, lattice –Ladder structure. Structures for the realization of discrete-time systems, Structures for FIR systems - Direct form, Cascade form, Frequency sampling, and Lattice structures.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand the importance of Z-transform **L2**
- Design the Structures for IIR and FIR systems **L6**

UNIT – IV:

Design of Digital Filters: General considerations–Causality and its implications, Characteristics of practical Frequency Selective Filters,

Design of IIR filters from analog filters–IIR filter design: approximation of derivatives, Impulse invariance method and bilinear transformation method, Frequency transformation in the analog and digital domains, Illustrative problems.

Design of FIR filters–Symmetric and asymmetric FIR filters, Design of linear phase FIR filters: using windows, using frequency sampling method.

Learning Outcomes:

At the end of this unit, the student will be able to

- Analyse the characteristics of practical Frequency Selective Filters **L4**
- Design IIR and FIR filters **L6**

UNIT – V:

Multirate Digital Signal Processing: Introduction, Decimation, and interpolation, Sampling rate conversion by a rational factor, Implementation of sampling rate conversion, Multistage implementation of sampling rate conversion, Sampling rate conversion of bandpass signals, Sampling rate conversion by arbitrary factor, Applications of multirate signal processing.

Learning Outcomes:

At the end of this unit, the student will be able to

- Gain knowledge about Decimation, Interpolation and Sampling rate conversion. **L1**
- Understand the applications of multirate signal processing **L2**

Text Books:

1. John G. Proakis and Dimitris G. Manolakis, "Digital signal processing, principles, Algorithms and applications",4th Edition, Pearson Education, 2007.
2. Emmanuel C. Ifeachor and Barrie W. Jervis, "Digital Signal Processing: A Practical Approach",4nd Edition, Pearson Education, 2002.

Reference Books:

1. Sanjit K Mitra, "Digital Signal Processing, A computer base approach", 3rd Edition, Tata McGraw Hill, 2009.
2. A. Anand Kumar, "Digital Signal Processing", 2nd Edition, PHI Learning, 2011

Course Outcomes:

At the end of this Course the student will be able to

- Learn the basic properties of signal & systems and Discrete Fourier Transform. **L1**
- Understand different types of Fast Fourier transform (FFT)algorithms. **L2**
- Design simple finite impulse response filters and analyze their stability. **L6**
- Analyze various structures used in implementation of FIR and IIR filters. **L4**
- Grasp the importance and applications of Multirate Digital signal processing. **L1**

B.Tech III Year II Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

19AEC63- MICROWAVE ENGINEERING

L	T	P	C
3	0	0	3

Course Objectives: The objectives of the course are to make the students learn about

- To analyze different modes in rectangular and circular waveguides and resonators
- To study and analyze various microwave components.
- To understand the principles of different microwave sources
- To gain knowledge on microwave semiconductor devices.
- To learn how to do different microwave measurements.

UNIT – I:

Waveguides & Resonators: Introduction, Microwave spectrum and bands, applications of Microwaves, Rectangular Waveguides-Solution of Wave Equation in Rectangular Coordinates, TE/TM mode analysis, Expressions for fields, Cutoff frequencies, filter characteristics, dominant and degenerate modes, sketches of TE and TM mode fields in the cross-section, Mode characteristics - Phase and Group velocities, wavelengths and impedance relations, Circular Waveguides - Dominant mode (qualitative treatment only), Rectangular Waveguides – Power Transmission and Power Losses, Impossibility of TEM Modes, losses, Q-factor, Cavity resonators-introduction, Rectangular and cylindrical cavities, dominant modes and resonant frequencies, Q-factor and coupling coefficients, Illustrative Problems.

Learning Outcomes:

At the end of this unit, the student will be able to

- Learn about Rectangular Wave guide sand resonators. **L1**
- Analyze different modes in rectangular and circular waveguides and resonators. **L4**

UNIT – II:

Waveguide Components: Scattering Matrix - Significance, Formulation and properties, Coupling mechanisms - Probe, Loop, Aperture types, Wave guide discontinuities - waveguide Windows, tuning screws and posts, matched loads, Waveguide attenuators - Resistive card, rotary vane Attenuators, waveguide phase shifters-dielectric, rotary vane phase shifters, Wave guide multiport junctions - E plane and H plane Tees, Magic Tee, Directional couplers-2 hole, Bothe hole types, Ferrites-composition and characteristics, Faraday rotation, Ferrite components - Gyrator, Isolator, Circulator, S Matrix calculations for 2-port junction, E plane and H plane Tees, Magic Tee, Directional coupler, circulator and Isolator, Illustrative Problems.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand Scattering matrix formulation and properties. **L2**
- Learn the working and applications of different microwave components. **L1**

UNIT – III:

Linear beam Tubes: Limitations and losses of conventional tubes at microwave frequencies, Classification of Microwave tubes, O type tubes - 2 cavity klystrons-structure, Reentrant cavities, velocity modulation process and Applegate diagram, bunching process and small signal theory-Expressions for o/p power and efficiency, Reflex Klystrons-structure, Velocity Modulation, Applegate diagram, mathematical theory of bunching, power output, efficiency, oscillating modes and o/p characteristics, Effect of Repeller Voltage on Power o/p, Significance, types and characteristics of slow wave structures, structure of TWT and amplification process (qualitative treatment), Suppression of oscillations, Gain considerations.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand different 'O' type microwave tube structures. **L2**
- Learn the principles and working of different microwave sources. **L1**

UNIT – IV:

Cross-field Tubes & Microwave Semiconductor Devices: Introduction, Cross field effects, Magnetrons-different types, cylindrical travelling wave magnetron-Hull cutoff and Hartree conditions, modes of resonance and PI-mode operation, separation of PI-mode, O/P characteristics, Introduction to Microwave semiconductor devices, classification, applications, Transfer Electronic Devices, Gunn diode - principles, RWH theory, Characteristics, Basic modes of operation - Gunn oscillation modes, LSA Mode, Varactor diode, Parametric amplifier, Introduction to Avalanche Transit time devices (brief treatment only), Illustrative Problems.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand cross field effects and working of cross field microwave tubes. **L2**
- Analyze the characteristics of microwave semiconductor devices. **L4**

UNIT – V:

Microwave Measurements: Description of Microwave bench-different blocks and their features, errors and precautions, Microwave power measurements, Measurement of attenuation, frequency, VSWR (low, medium, high), Measurement of 'Q' of a cavity, Impedance measurements.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand microwave bench setup and precautions to be taken while doing microwave measurements.(L2) **L1**
- Explain different microwave measurements.(L1) **L2**

Text Books:

1. Samuel Y. Liao, "Microwave devices and circuits",3rd Edition, Pearson Publishing, 2003.
2. R. E. Collin, "Foundations for microwave engineering", 2nd Edition, John Wiley, 2002.

Reference Books:

1. G.S.N Raju, "Microwave Engineering", 2nd Edition, IK International Publications 2008.
2. M. Kulkarni, "Microwave and Radar Engineering", Umesh Publications, 4th edition 2009.

Course Outcomes:

At the end of this Course the student will be able to

- Analyze different modes in rectangular and circular waveguides and resonators **L4**
- Explain the working of various microwave components. **L1**
- Understand the principles of microwave sources **L2**
- Compare the performance of various microwave semiconductor devices. **L2**
- Explain how to do different microwave measurements. **L1**

B.Tech III Year II Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

19AEC64a- OPTICAL COMMUNICATIONS

(Professional Elective – II)

L	T	P	C
3	0	0	3

Course Objectives: The objectives of the course are to make the students learn about

- To comprehend the basic concepts and functional blocks in optical communications.
- To read and analyze different types of signal distortions and losses in optical communication.
- To gain knowledge on optical sources and coupling.
- To introduce concepts related to photo detectors and fiber optical receivers.
- To learn about the optical systems design and applications.

UNIT – I:

Introduction to Optical Fibers: Evolution of fiber optic system- Element of an Optical Fiber Transmission link- Ray Optics-Optical Fiber Modes and Configurations –Mode theory of Circular Wave guides- Overview of Modes-Key Modal concepts- Linearly Polarized Modes –Single Mode Fibers-Graded Index fiber structure.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand the basic concepts of optical communication. **L2**
- Analyze different optical Fiber modes and configurations. **L4**

UNIT – II:

Signal Degradation Optical Fibers: Attenuation – Absorption losses, Scattering losses, Bending Losses, Core and Cladding losses, Signal Distortion in Optical Wave guides - Information Capacity determination – Group Delay- Material Dispersion, Wave guide Dispersion, Signal distortion in SM fibers-Polarization Mode dispersion, Intermodal dispersion, Pulse Broadening in GI fibers-Mode Coupling –Design Optimization of SM fibers-RI profile and cut-off wavelength.

Learning Outcomes:

At the end of this unit, the student will be able to

- Analyze the losses due to scattering, bending, core and cladding. **L4**
- Understand different type's dispersion mechanisms. **L2**

UNIT – III:

Fiber Optical Sources and Coupling : Direct and indirect Band gap materials-LED structures –Light source materials –Quantum efficiency and LED power, Modulation of a LED, lasers Diodes-Modes and Threshold condition –Rate equations –External Quantum efficiency –Resonant frequencies –Temperature effects, Introduction to Quantum laser, source-to-fiber Power Launching, Lensing schemes, Fibre –to- Fibre joints, Fibre splicing.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand different types of light source materials and their structures. **L2**
- Know about the importance of different types connectors. **L1**

UNIT – IV:

Fiber Optical Receivers : PIN and APD diodes –Photo detector noise, SNR, Detector Response time, Avalanche Multiplication Noise –Comparison of Photo detectors –Fundamental Receiver Operation – preamplifiers, Error Sources –Receiver Configuration –Probability of Error – Quantum Limit.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand the operation of Photo Detectors. **L2**
- Know about fiber optical receiver operation and various sources of error. **L1**

UNIT – V:

System Design and Applications: Design of Analog Systems: system specification, power budget, bandwidth budget

Design of Digital Systems: system specification, rise time budget, power budget, Receiver sensitivity, Overview of WDM.

Applications: Telephony, Telemetry, video distribution, military applications, passive and active sensing.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand the design and specifications of analog and digital systems.(L2) **L1**
- Summarize the applications of optical communications.(L1) **L2**

Text Books:

1. Gerd Keiser, "Optical Fiber Communication", 3rd Edition, McGraw –Hill International, Singapore, 2000.
2. J.Senior, "Optical Fiber Communication, Principles and Practice", 3rd Edition, Pearson Publishers, 2010.

Reference Books:

1. Max Ming-Kang Liu, "Principles and Applications of Optical Communications", 1st Edition, TMH, 2010.
2. S.C.Gupta, "Text book on optical fiber communication and its applications", 2nd Edition, PHI, 2012.

Course Outcomes:

At the end of this Course the student will be able to

- Understand the basic concepts and about the functional blocks in optical communication. **L2**
- Analyze different types of signal distortions and losses in optical communication. **L4**
- Gain the knowledge on optical sources and coupling. **L1**
- Understand the concepts related to photo detectors and fiber optical receivers. **L2**
- Know about the optical systems design and applications. **L1**

B.Tech III Year II Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

19AEC64b- CELLULAR & MOBILE COMMUNICATIONS

(Professional Elective – II)

L	T	P	C
3	0	0	3

Course Objectives: The objectives of the course are to make the students learn about

- To comprehend the basic elements of cellular and mobile communications.
- To introduce about Co-channel interference and cell splitting in cellular communication.
- To gain an understanding of signal coverage and propagation losses.
- To learn about frequency management, channel assignment and the antennas used at cell site and mobile.
- To introduce types of digital cellular networks and hands off mechanism.

UNIT – I:

Cellular Mobile Radio Systems: Introduction to Cellular Mobile system, performance criteria, uniqueness of mobile radio environment, operation of cellular systems, Hexagonal shaped cells, Analog and Digital Cellular systems.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand basic concepts of cellular and mobile communications. **L2**
- Know about cell shape, Analog and Digital Cellular systems. **L1**

UNIT – II:

Elements of Cellular Radio System Design: General description of the problem, concept of frequency channels, Co-channel Interference Reduction Factor, desired C/I from a normal case in a Omni directional Antenna system, Cell splitting, consideration of the components of cellular system.

Interference: Introduction to Co-channel interference, real time co-channel interference, Co-channel measurement, design of Antenna system, Antenna parameters and their effects, diversity receiver, non-co-channel interference-different types.

Learning Outcomes:

At the end of this unit, the student will be able to

- Gain knowledge on Co-channel Interference and cell splitting. **L1**
- Understand co-channel interference effects and reduction techniques. **L2**

UNIT – III:

Cell Coverage for Signal and Traffic: Signal reflections in flat and hilly terrain, effect of human made structures, phase difference between direct and reflected paths, constant standard deviation, straight line path loss slope, general formula for mobile propagation over water and flat open area, near and long distance propagation antenna height gain, form of a point to point model.

At the end of this unit, the student will be able to

- Learn about the cell signal coverage and impact of surrounding environment. **L1**
- Understand different signal propagation methods and their effects. **L2**

UNIT – IV:

Cell Site and Mobile Antennas: Sum and difference patterns and their synthesis, Omni directional antennas, directional antennas for interference reduction, space diversity antennas, umbrella pattern antennas, minimum separation of cell site antennas, high gain antennas.

Frequency Management and Channel Assignment: Numbering and grouping, setup access and paging channels channel assignments to cell sites and mobile units, channel sharing and borrowing, sectorization, overlaid cells, non fixed channel assignment.

Learning Outcomes:

At the end of this unit, the student will be able to

- Know about the consideration of antennas and pattern synthesis at cell site and mobile. **L1**
- Understand frequency management and channel assignment. **L2**

UNIT – V:

Handoff: Handoff, dropped calls and cell splitting, types of handoff, handoff invitation, delaying handoff, forced handoff, mobile assigned handoff. Intersystem handoff, cell splitting, micro cells, vehicle locating methods, dropped call rates and their evaluation.

Digital Cellular Networks: GSM architecture, GSM channels, multiplex access scheme, TDMA, CDMA.

Learning Outcomes:

At the end of this unit, the student will be able to

- Appreciate the Handoff concept and types of handoff. **L1**
- Know about different types of digital cellular networks. **L1**

Text Books:

1. W .C. Y. Lee, "Mobile cellular telecommunications", Tata Mc-Graw Hill, 2nd Edition, 2006.
2. Theodore. S. Rapport, "Wireless communications", Pearson Education, 2ndEdn., 2002

Reference Books:

1. Gordon L. Stuber, "Principles of Mobile communications", Springer International 2nd Edition, 2007.
2. Lee , "Wireless and Mobile Communications", Mc Graw Hills, 3rd Edition, 2006.
3. Jon W.Mark and Weihua Zhqung, "Wireless communications and Networking", PHI, 2005.
4. R.Blake, "Wireless communication Technology", Thompson Asia Pvt .Ltd., 2004.

Course Outcomes:

At the end of this Course the student will be able to

- Learn the basic elements of cellular and mobile communications. **L1**
- Understand Co-channel interference and cell splitting concepts in cellular communication. **L2**
- Gain an understanding of signal coverage and propagation losses. **L2**
- Explain about frequency management, channel assignment and antennas used at cell site and mobile. **L1**
- Know about types of digital cellular networks and hands off mechanism. **L1**

B.Tech III Year II Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

19AEC64c- MACHINE LEARNING TECHNIQUES

(Professional Elective – II)

L	T	P	C
3	0	0	3

Course Objectives: The objectives of the course are to make the students learn about

- To comprehend the basics of machine learning and learning systems.
- To introduce to different types of linear models and applications.
- To gain an understanding of constructing decision trees and probabilistic models.
- To analyze dimensionality reduction models and genetic algorithms
- To introduce to different types of graphical models and tracking methods.

UNIT – I:

Introduction: Learning, Types of Machine Learning, Supervised Learning, The Brain and the Neuron, Design a Learning System, Perspectives and Issues in Machine Learning , Concept Learning Task, Concept Learning as Search, Finding a Maximally Specific Hypothesis, Version Spaces and the Candidate Elimination Algorithm, Linear Discriminants, Perceptron, Linear Separability, Linear Regression.

Learning Outcomes:

At the end of this unit, the student will be able to

- Appreciate the basic concepts of machine learning. **L1**
- Know about different types of learning systems. **L1**

UNIT – II:

Linear Models: Multi-layer Perceptron, Going Forwards, Going Backwards, Back Propagation Error, Multi-layer Perceptron in Practice, Examples of using the MLP, Overview, Deriving Back-Propagation, Radial Basis Functions and Splines, Concepts, RBF Network, Curse of Dimensionality, Interpolations and Basis Functions, Support Vector Machines.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand different types of linear models. **L2**
- Know different concepts of linear models and their applications. **L1**

UNIT – III:

Tree and Probabilistic Models: Learning with Trees, Decision Trees, Constructing Decision Trees, Classification and Regression Trees, Ensemble Learning, Boosting, Bagging, Different ways to Combine Classifiers, Probability and Learning, Data into Probabilities, Basic Statistics, Gaussian Mixture Models, Nearest Neighbor Methods, Unsupervised Learning, K means Algorithms, Vector Quantization, Self Organizing Feature Map.

Learning Outcomes:

At the end of this unit, the student will be able to

- Learn the construction of decision trees and their classification. **L1**
- Know the uses and applications of probabilistic models. **L1**

UNIT – IV:

Dimensionality Reduction and Evolutionary Models: Dimensionality Reduction, Linear Discriminant Analysis, Principal Component Analysis, Factor Analysis, Independent Component Analysis, Locally Linear Embedding,Isomap, Least Squares Optimization, Evolutionary Learning, Genetic algorithms, Genetic Offspring, Genetic Operators, Using Genetic Algorithms, Reinforcement Learning, Overview, Getting Lost Example, Markov Decision Process.

Learning Outcomes:

At the end of this unit, the student will be able to

- Analyze dimensionality reduction models.(L4) **L1**
- Understand evolutionary models and how to apply genetic algorithms. **L2**

UNIT – V:

Graphical Models: Markov Chain Monte Carlo Methods, Sampling, Proposal Distribution, Markov Chain Monte Carlo, Graphical Models, Bayesian Networks, Markov Random Fields, Hidden Markov Models, Tracking Methods.

Learning Outcomes:

At the end of this unit, the student will be able to

- Learn different types of graphical models. **L1**
- Understand different types tracking methods. **L2**

Text Books:

1. Stephen Marsland, "Machine Learning – An Algorithmic Perspective", Second Edition,CRC Press, 2014.
2. Tom M Mitchell, "Machine Learning", First Edition, McGraw Hill Education, 2013.

Reference Books:

1. Peter Flach, "Machine Learning: The Art and Science of Algorithms that Make Sense of Data", First Edition, Cambridge University Press, 2012.
2. Jason Bell, "Machine learning – Hands on for Developers and Technical Professionals", First Edition, Wiley, 2014
3. EthemAlpaydin, "Introduction to Machine Learning 3e (Adaptive Computation and Machine Learning Series)", Third Edition, MIT Press, 2014

Course Outcomes:

At the end of this Course the student will be able to

- Learn the basics of machine learning and learning systems. **L1**
- Understand different types of linear models and applications. **L2**
- Gain an understanding of constructing decision trees and probabilistic models. **L1**
- Analyze dimensionality reduction models and genetic algorithms **L4**
- Compare and differentiate different types of graphical models and tracking methods. **L2**

B.Tech III Year II Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

19AHS11-COMPETITIVE & SPOKEN ENGLISH

(Open Elective-II)

L	T	P	C
3	0	0	3

Course Objectives:

- To train students to use language effectively in everyday conversations and to participate in group discussions.
- To enable them to learn and practice competitive English and ready for competitive examinations.

UNIT – 1: Grammar

Sentences-Construction-Types-Affirmative-Interrogative-Nouns-Pronouns-Verbs-Models-Tenses-Adverb-Adjective-Speech-Voice-Articles-Prepositions-Conjunctions.

Learning Outcomes:

At the end of this unit, the student will be able to

- Students will improve their speaking ability in English both in terms of fluency and comprehensibility by enlarging their vocabulary. **L1**
- Students will attain and enhance competence in the four modes of literacy: listening, speaking, reading and writing **L2**

UNIT – II: Vocabulary

Content of the Unit – II

Competitive Vocabulary List-Word Building Tips- Antonyms-Synonyms-One word Substitutes-Idioms and Phrases-Phrasal Verbs-Reading Comprehension-importance- tips- Cracking unknown passage.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand the factors that influence use of grammar and vocabulary in speech and writing **L1**
- Comprehend the meaning of paragraphs and unknown passages **L2**

UNIT – III: Speaking Skills

Dynamics of Speaking-Communication Skills -Public Speaking- Significance to Professionals- establishing credibility & Confidence- Preparation of Speech-Audience-Analysis -Topic generation Techniques.

Learning Outcomes:

At the end of this unit, the student will be able to

- Display competence in oral, written and visual communication **L1**
- Showan understanding of opportunities in the field of communication **L2**

UNIT – IV: Stage Dynamics

Organization of Speech- Platform Manners- Body language- Psychology of Persuasion- Speeches for Special Occasions-exercises-Recording and feedback sessions.

Learning Outcomes:

At the end of this unit, the student will be able to

- Analyze your audience and design speeches to reflect your analysis. **L1**
- Evaluate speeches based on a variety of verbal and non-verbal criteria. **L2**

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UNIT – V:Accent Neutralization

Realization of past tense and plural forms- Stress Rules– Intonation- Connected speech- weak forms-assimilation-elision- Linking and Intrusion-juncture-contractions.

Learning Outcomes:

At the end of this unit, the student will be able to

- Able to identify which are stressed and unstressed words. **L1**
- Reproduce in speech, appropriate pattern of intonation and rhythm. **L2**

Reference Books:

1. Hari Mohan Prasad, ***Objective English for Competitive Examination,*** Tata McGraw Hill, New Delhi, 2014.
2. V SASIKUMAR and PV DHAMIJA ***: SPOKEN ENGLISH A Self- Learning Guide to Conversation Practice,*** 2nd Edition, TATA McGRAW-HILL'S SERIES.
3. M.Sambaiah, ***Technical English,*** Wiley publishers India. New Delhi. 2014.
4. JK GANGAL, A PRCACTICAL COURSE IN EFFECTIVE ENGLISHSPEAKING SKILLS, PHI LEARNING Private Ltd. New Delhi. 2012
5. KRISHNA MOHAN and N.P. SINGH,***SPEAKING ENGLISH EFFECTIVELY,*** 2nd Edition, Trinity Press, 2015.
6. Wren and Martin,***High School English Grammar and Composition,*** S. Chand Publication, New Delhi, 2014.
7. Neetu Singh, ***English for General Competitions from Plinth To Paramount (Volume-I&II),***Paramount Reader Publications, 2014.
8. Dale Carnegie,***The Quick And Easy Way To Effective Speaking***, Vermilion Publications, 1990.
9. E Suresh Kumar. ***Effective Publish Speaking,*** Orient Longman, 2016.

Course Outcomes:

At the end of this Course the student will be able to

- Becoming active participants in the learning process and acquiring proficiency in spoken English of the students. **L1**
- Speaking with clarity and confidence thereby enhancing employability skills of the students. **L2**
- Participate in critical conversations and prepare, organize and deliver in public contexts **L3**
- Improving their speaking ability in English both in terms of fluency and comprehensibility **L4**
- Equipped with competitive proficiency in English for various competitive examinations at state, national and international level. **L5**

B.Tech III Year II Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

19ABS23-INTEGRAL TRANSFORMS AND ITS APPLICATIONS

(Open Elective -II)

L	T	P	C
3	0	0	3

Course Objectives: This course aims at providing the student

- With the concepts and several methods of integral transforms and its applications.
- The concepts of fractional calculus and its applications.

UNIT – 1: Basic concepts of integral transforms:: Fourier transforms: **9 Hrs**

Introduction, basic properties, applications to solutions of Ordinary Differential Equations (ODE), Partial Differential Equations (PDE) and Integral Equations.

Learning Outcomes:

At the end of this unit, the student will be able to

- Solve ordinary differential equations and partial differential equations. **L3**
- Solve Integral equations. **L3**

UNIT – II: Laplace transforms:

Introduction, existence criteria, Convolution, differentiation, integration, inverse transform, Tauberian Theorems, Watson's Lemma, solutions to ODE, PDE including Initial Value Problems (IVP) and Boundary Value Problems (BVP).

Applications of joint Fourier-Laplace transform, definite integrals, summation of infinite series, transfer functions, impulse response function of linear systems.

Learning Outcomes:

At the end of this unit, the student will be able to

- Solve initial and boundary value problems using Laplace transform technique. **L3**
- Apply the techniques of joint Fourier-Laplace transform techniques. **L4**

UNIT – III: Hankel Transforms & Hilbert Transforms

Hankel Transforms: Introduction, properties and applications to PDE Mellin transforms: Introduction, properties, applications; Generalized Mellin transforms.

Hilbert Transforms: Introduction, definition, basic properties, Hilbert transforms in complex plane, applications; asymptotic expansions of 1-sided Hilbert transforms.

Learning Outcomes:

At the end of this unit, the student will be able to

- Solve PDE by using the concepts of Hankel transforms. **L4**
- Learn the concepts of Hilbert transforms. **L3**

UNIT – IV: Stieltjes Transform, Legendre transforms and Radon transforms

Stieltjes Transform:

Definition, properties, applications, inversion theorems, properties of generalized Stieltjestrans form.

Legendre transforms:

Introduction, definition, properties, applications.

Radon transforms:

Introduction, properties, derivatives, convolution theorem, applications, inverse radon transform.

Learning Outcomes:

At the end of this unit, the student will be able to

- Analyzes the Stieltje's and Legender's transforms. **L4**
- Analyzes random transforms and focuses on thier applications. **L3**

UNIT – V: Fractional Calculus and its applications & Integral transforms in fractional equations

Fractional Calculus and its applications: Introduction, fractional derivatives, integrals, Laplace transform of fractional integrals and derivatives.

Integral transforms in fractional equations: fractional ODE, integral equations, IVP for fractional Differential Equations (DE), fractional PDE, green's function for fractional DE.

Learning Outcomes:

At the end of this unit, the student will be able to

- Learn the basic concepts of fractional calculus. **L2**
- Applies the concepts of integral transforms in fractional calculus. **L4**

Text Books:

1. Advanced Topics in Applied Mathematics for Engg. & physical Science: Sudhakar Nair
2. Introduction to Applied Mathematics, Gilbert Strang

Reference Books:

1. Fractional Calculus Theory and Applications of Differentiation and Integration to Arbitrary Order: J. Spanier and K. B. Oldham
2. Handbook of Mathematical Functions: M. Abramowitz & I. Stegun

Course Outcomes:

At the end of this Course the student will be able to

- Use the basic concepts of integral transforms, Stieltjes Transform, Legendre transforms and Radon transforms etc., in real life problems. **L1**
- Use the concepts of Laplace transforms in solving the initial value and boundary value problems. **L2**
- Applies the concepts of Hankel Transforms & Hilbert Transforms while addressing the various problems related to engineering sciences. **L3**
- Analyze the problems in engineering and technology using various techniques of integral transforms and applications. **L4**
- Uses the ideas of fractional calculus and its applications in solve the real world problems. **L5**

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B.Tech III Year II Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

19ABS24-NUMERICAL ANALYSIS

(Open Elective –II)

L	T	P	C
3	0	0	3

Course Objectives: This course aims at providing the student

- With the concepts and several methods of Numerical methods.
- To explore the solutions of ordinary differential equations, partial differential equations and integral equations.

UNIT – 1: Solution of Algebraic and Transcendental equations & Solution to System of Nonlinear Equations and Spline Functions **9 Hrs**

Solution of Algebraic and Transcendental equations:

Ramanujan's method – Secant method – Muller's method – Graeffe's root-squaring method – Lin-Bairstow's method – Quotient-Difference method

Solution to System of Nonlinear Equations and Spline Functions:

Method of Iteration- Newton-Raphson method. Linear splines - Quadratic splines – Cubic splines : Minimizing property of Cubic splines – Error in the Cubic Spline ad its derivatives – Surface fitting by cubic splines. – Cubic B-Splines: Representation of B- Splines – Least squares solution – Applications of B-Splines.

Learning Outcomes:

At the end of this unit, the student will be able to

- Solve the algebraic and transcendental equations **L2**
- Solve the system of nonlinear equations and spline functions. **L4**

UNIT – II: Numerical Linear Algebra:

Triangular matrices – LU decomposition of a matrix – vector and matrix norms. – Solutions of linear systems – Direct methods: Gauss elimination – necessary for pivoting – Gauss-Jordan method – modification of the Gauss method to compute the inverse – number of arithmetic operations – LU decomposition method – computational procedure for LU decomposition method – Lu decomposition from Gauss elimination – solution of tridiagonal systems – Ill conditioned linear systems – Method for Ill- conditioned systems. – Solution of linear systems –Iterative methods. – Matrix Eigen value problems – Eigen values of a symmetric tridiagonal matrix – Householder's method – QR method.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand the concepts of numerical linear algebra. **L1**
- Apply the concepts of numerical linear algebra. **L3**

UNIT – III: Numerical solution of ordinary differential equations:

Solution by Taylor's series, Picard's method,Euluer's method , Runge-Kutta methods, Predictor-Corrector methods: Adams-Moulton method – Milne's method. – Cubic Spline method – Simultaneous and higher order equations. – Boundary value problems: Finite difference method – Cubic Spline method – Galerkin's method.

Learning Outcomes:

At the end of this unit, the student will be able to

- Solve first order initial value problems. **L3**
- Solve ssimultaneous and higher order equations and boundary value problems. **L4**

UNIT – IV: Numerical solution of Partial differential equations:

Learning Outcomes:

At the end of this unit, the student will be able to

- Solve Laplace's equation using finite difference technique. **L3**
- Solve Heat equation and wave equation. **L4**

UNIT – V: Numerical solution of Integral equations:

Numerical methods for Fredholm equations: Method of degenerate Kernels – method of successive approximations – Quadrature methods – use of Chebyshev series – cubic Spline method – singular Kernels – method of invariant imbedding.

Learning Outcomes:

At the end of this unit, the student will be able to

- Apply numerical methods for solving Fredholm equations. **L3**
- Analyzes cubic Spline method, singular Kernels – method of invariant imbedding etc. **L4**

Text Books:

1. S. S. Sastry, Introductory Methods of Numerical Analysis(Fifth Edition 2012), PHI Learning Private Limited, New Delhi.

Reference Books:

1. M.K.Jain,S.R.K.Iyengar, R.K.Jain, Numerical Methods for Scientific and Engineering Computation (sixth edition),Nee Age International(P) Limited, Publishers, New Delhi.
2. K.E. Atkinson, An Introduction to Numerical Analysis, Wiley, 1989.S.D. Conte and C. De Boor, Elementary Numerical Analysis 302226 An Algorithmic Approach, McGraw-Hill, 1981.
3. K. Eriksson, D. Estep, P. Hansbo and C. Johnson, Computational Differential Equations, Cambridge Univ. Press, Cambridge, 1996.
4. G.H. Golub and J.M. Ortega, Scientific Computing and Differential Equations: An Introduction to Numerical Methods, Academic Press, 1992.
5. J. Stoer and R. Bulirsch, Introduction to Numerical Analysis, 2nd ed., Texts in Applied Mathematics, Vol. 12, Springer Verlag, New York, 1993.

Course Outcomes:

At the end of this Course the student will be able to

- Understand the need of numerical methods in solving engineering problems of various fields. **L1**
- Learn various numerical techniques to solve initial and boundary value problems. **L2**
- Apply various methods in solving initial and boundary value problems **L3**
- Emphasizes the numerical solutions of Integral equations. **L4**
- Analyze the problems in engineering and technology using various techniques of Numerical methods. **L5**

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JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

19ABS25-OPTIMIZATION TECHNIQUES

(Open Elective -II)

L	T	P	C
3	0	0	3

Course Objectives: This course aims at providing the student

- With the basic concepts and several methods of optimization.
- With the concepts of geometric programming & constrained minimization problems.

UNIT – 1: Linear programming I : Simplex Method **9 Hrs**

Introduction, Applications of Linear Programming, Standard form of a Linear Programming Problem, Geometry of Linear Programming Problems, Basic Definitions in Linear Programming. Simplex Method, Simplex Algorithm and Two phase Simplex Method.

Learning Outcomes:

At the end of this unit, the student will be able to

- Solve the problems related to linear programming. **L3**
- Lear the simplex method and two phase simplex method. **L3**

UNIT – II: Linear programming II : Duality in Linear Programming

Symmetric Primal-Dual Relations, General Primal-Dual Relations, Duality Theorem, Dual Simplex Method, Transportation Problem and assignment problem.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand the dual relations and duality theorem **L2**
- Solve transportation problem and assignment problem. **L4**

UNIT – III: Non-linear programming: Unconstrained optimization techniques & Direct Search Methods

Non-linear programming: Unconstrained optimization techniques: Introduction: Classification of Unconstrained minimization methods

Direct Search Methods: Random Search Methods: Random jumping Method, Random Walk method. Grid Search Method.

Learning Outcomes:

At the end of this unit, the student will be able to

- Classify Unconstrained minimization methods and direct search methods. **L2**
- Apply the unconstrained minimization methods and direct search methods **L3**

UNIT – IV: Non-linear programming: Constrained optimization techniques

Introduction , Characteristics of a constrained problem, Random Search Methods, complex method, Sequential linear programming, Basic approach in methods of Feasible directions, Zoutendijk's method of feasible directions: direction finding problem, determination of step length, Termination criteria.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand the Constrained optimization techniques. **L2**
- Solve nonlinear programming problems. **L3**

UNIT – V: Geometric Programming & Constrained minimization Problems

Geometric Programming:

Unconstrained Minimization Problems: solution of unconstrained geometric programming using differential calculus and arithmetic-geometric inequality.

Constrained minimization Problems :

Solution of a constrained geometric programming problem, primal-dual programming in case of less-than inequalities, geometric programming with mixed inequality constraints.

Learning Outcomes:

At the end of this unit, the student will be able to

- Solve unconstrained geometric programming using differential calculus and arithmetic-geometric inequality. **L3**
- Solve Solution of a constrained geometric programming problem, primal-dual programming. **L4**

Text Books:

1. Singiresu S Rao., Engineering Optimization: Theory and Practices, New Age Int. (P) Ltd. Publishers, New Delhi.

Reference Books:

1. Chong, E.K.P.and Zak, S. H.. An Introduction to Optimization, John Wiley & Sons, N.Y.
2. Peressimi A.L., Sullivan F.E., Vhl, J.J..Mathematics of Non-linear Programming, Springer – Verlag.

Course Outcomes:

At the end of this Course the student will be able to

- Remembers the concepts of linear programming problems. **L1**
- Understand various techniques of linear programming problems. **L2**
- Solve constrained and unconstrained linear programming problems. **L3**
- Analyzes geometric programming using differential calculus and arithmetic-geometric inequality. **L4**
- Analyze optimization problems that occur in real world in engineering and technology using various elegant optimization techniques. **L5**

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B.Tech III Year II Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS)::PULIVENDULA

19ABS33-FUNCTIONAL NANOMATERIALS FOR ENGINEERS

(Open Elective-II)

L	T	P	C
3	0	0	3

Course Objectives:

- To learn and understand the fundamental concepts of functional/smart nanomaterials.
- To understand the classification and important applications of functional materials
- To learn and understand the materials utilized for energy applications
- To learn and understand the principle and applications of nanosensors
- To understand the concept of self-assembling molecular layers and its applications

UNIT – I: INTRODUCTION TO FUNCTIONAL /SMART NANOMATERIALS **9 Hrs**

Introduction: Nanomaterials and their importance (in brief), Functional/ Smart Nanomaterials, – (Hydrogels, polymer brushes, Carbon nanotubes, Cellulose),Functionalization techniques, Properties of Smart materials (Sensing materials, Actuation materials, Control devices, Self-detection, self-diagnostics, Self-corrective, self-controlled, self-healing, Shock Absorbers, Damage arrest)-components of smart systems (Sensor :- Data Acquisition, Data Transmission; Command and control unit, Actuator:- Data Instructions, Action Devices)

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand the basic properties and fictionalization of smart nanomaterials L1
- Explain the need of functional/smart nanomaterials for advanced technology L2
- Identify engineering applications of sensors L3
- Analyze the sensing, control and detection mechanism in smart nanomaterials L4
- Illustrate the components of smart systems L2

UNIT – II: CLASSIFICATION AND APPLICATIONS **9 Hrs**

Classification of smart materials (piezoelectric, electrostrictive, Magnetostrictive, Thermoresponsive, Electrochromic and Smart gels), Shape Memory Alloys and their working principle, Quantum Tunneling Composites and their working principle, Applications of smart materials in Aircrafts, Medicine, Robotics, Smart fabrics, Sporting goods and smart glass, Merits and demerits of smart materials.

Learning Outcomes:

At the end of this unit, the student will be able to

- Classify smart materials based on electrical, magnetic and thermal characteristics L1
- Understand the basic concepts and working principle of memory alloys L2
- Identifies the Engineering applications of smart materials L2
- Apply the concepts to Aircrafts, Medicine and Robotic fields L3
- Explain the working principle of Quantum Tunneling Composites L2
- Identify the Merits and demerits of smart materials in engineering field L2

UNIT – III: NANOSENSORS

Introduction, Sensor definition, Working principle of nanosensors, Types of nanosensors (Physical nanosensors – Pressure, Force, Mass, Displacement, Optical nanosensors – Proximity, Ambient light, Chemical nanosensors- Chemical composition, Molecular concentration). Applications of nanosensors (Medicine, Aerospace, Communication, Structural Engineering).

Learning Outcomes:

At the end of this unit, the student will be able to

- Explain the working principle and concept of nanosensors L1
- Classify the nanosensors based on their working principle and application L2

- Summarize various types of nanosensors L2
- Explain the applications of nanosensors in various fields L2
- Apply the concept of nanosensors in Medicine, Aerospace, Communication, Structural Engineering fields L3

UNIT – IV: SELF-ASSEMBLING MOLECULAR LAYERS 9Hrs

Introduction, principles of self-assembly, monolayers, Characteristics of Self assembled monolayers (SAMs), Molecular SAMs, Types of SAMs, Factors influencing Monolayer order, methods of preparation (Langmuir- Boldgett film : Mechanism, Experimental arrangement, Assembly, Advantages and disadvantages of LB films) patterning of SAMs (Locally attract, Locally remove, Modify tail group). Applications (Self-cleaning and moisture repellent).

Learning Outcomes:

At the end of this unit, the student will be able to

- Explain the concept of self-assembling L1
- Understand the significance of molecular layers L2
- Explain the concept of Langmuir- Boldgett film preparation L2
- Explain the important factors influencing Monolayer order L2
- Classify the materials based on patterning of SAMs L2
- Apply the concept of Self-cleaning and moisture repellent L3

UNIT – V: NANOMATERIALS FOR ENERGY APPLICATIONS

Introduction, **Solar Cells** (Silicon Solar Cells, Thin film Solar Cells, Organic Solar Cells - Dye Sensitized Solar Cells, Polymer solar cells) Working Principle, Efficiency estimation and advantages, **Hydrogen Fuel Cells** – Working Principle, Structure, Assembly of fuel cell, **Water splitting** – H_2 Production, Photocatalytic process.

Learning Outcomes:

At the end of this unit, the student will be able to

- Explain the concept of solar cell L1
- Classify the solar cells based on manufacturing material L2
- Explain the construction and working principle of solar cell L2
- Interpret the efficiency and advantages in various solar cells L2
- Explain the construction and working principle of hydrogen cells L2
- Identify applications of water splitting for H_2 production L2
- Explain the photocatalytic process L2

Text Books:

1. YaserDahman, Nanotechnology and Functional Materials for Engineers-, Elsevier, 2012
2. E. Zschech,C. Whelan, T. Mikolajick, Materials for Information Technology: Devices, Interconnects and Packaging Springer-Verlag London Limited 2005.

Reference Books:

1. Gauenzi,P.,Smart Structures, Wiley, 2009.
2. MahmoodAliofkhazraei, Handbook of functional nanomaterials, Vol (1&2), Nova Publishers, 2014.

Course Outcomes:

At the end of this Course the student will be able to

- Identify the various functional/smart nanomaterials materials L1
- Classify the smart nanomaterials based their applications and properties L2
- Apply the various functional nanomaterials in various applications L3

B.Tech III Year II Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS)::PULIVENDULA

19ABS34-MATERIALS CHARACTERIZATION TECHNIQUES

(Open Elective-II)

L	T	P	C
3	0	0	3

Course Objectives:

- To learn and understand an exposure to evaluation of special characteristics of materials.
- To understand the principle and important applications of characterization techniques
- To learn and understand the materials structural characteristics
- To learn and understand the materials Mechanical & Thermal characteristics

UNIT – I: STRUCTURE ANALYSIS BY POWDER X-RAY DIFFRACTION **9 Hrs**

Introduction, Bragg's law of diffraction, Intensity of Diffracted beams –factors affecting Diffraction Intensities - structure of polycrystalline Aggregates, Determination of crystal structure, Crystallite size by Scherrer and WH Methods, Small angle X-ray scattering (SAXS) (in brief).

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand the diffraction phenomenon in crystals **L1**
- Identify the factors affecting diffraction pattern intensities **L2**
- Explain the polycrystalline nature of the material **L3**
- Analyze the crystal structure and crystallite size by various methods **L4**
- Illustrate the Small angle X-ray scattering (SAXS) **L2**

UNIT – II: MICROSCOPY TECHNIQUE -1 –SCANNING ELECTRON MICROSCOPY(SEM) 9 Hrs

Introduction, Principle, Construction and working principle of Scanning Electron Microscope, Specimen preparation, Different types of modes used (Secondary Electron and Backscatter Electron), Advantages, limitations and applications of SEM.

Learning Outcomes:

At the end of this unit, the student will be able to

- Explain the basic concepts and working principle of Scanning Electron Microscope **L1**
- Classify the different types of Scanning Electron Microscope modes used **L2**
- Identifies the specimen preparation for Scanning Electron Microscope **L2**
- Analyze the morphology of the sample by using Scanning Electron Microscope **L4**
- Understand the advantages and limitations of Scanning Electron Microscope **L2**

UNIT – III: MICROSCOPY TECHNIQUE -2 - TRANSMISSION ELECTRON MICROSCOPY (TEM) **9Hrs**

Construction and Working principle, Resolving power and Magnification, Bright and dark fields, Diffraction and image formation, Specimen preparation, Selected Area Diffraction, Applications of Transmission Electron Microscopy, Difference between SEM and TEM, Advantages and Limitations of Transmission Electron Microscopy.

Learning Outcomes:

- Explain the basic principle and working principle of Transmission Electron Microscope
- Classify the different types of Transmission Electron Microscope modes used **L1**
- Identifies the specimen preparation for Transmission Electron Microscope **L2**
- Analyze the morphology and crystal structure of the sample by using Transmission Electron Microscope **L2**
- Understand the advantages and limitations of Transmission Electron Microscope **L2**
- Explain the basic principle and working principle of Transmission Electron Microscope **L3**

UNIT – IV:SPECTROSCOPY TECHNIQUES **9Hrs**

Principle, Experimental arrangement, Analysis and Advantages of the spectroscopic techniques – (i) UV-Visible spectroscopy (ii) Raman Spectroscopy, (iii) Fourier Transform infrared (FTIR) spectroscopy, (iv) X-ray photoelectron spectroscopy (XPS).

Learning Outcomes:

At the end of this unit, the student will be able to

- Explain the principle and experimental arrangement of spectrometers **L1**
- Understand the analysis and advantages of the spectroscopic techniques **L2**
- Explain the concept of UV-Visible spectroscopy **L2**
- Explain the principle and experimental arrangement of Raman Spectroscopy **L2**
- Explain the principle and experimental arrangement of Fourier Transform infrared (FTIR) spectroscopy **L2**
- Explain the principle and experimental arrangement of X-ray photoelectron spectroscopy (XPS) **L2**

UNIT – V: ELECTRICAL & MAGNETIC CHARACTERIZATION TECHNIQUES

Electrical Properties analysis techniques (DC conductivity, AC conductivity) Activation Energy, Effect of Magnetic field on the electrical properties (Hall Effect). Magnetization measurement by induction method, Vibrating sample Magnetometer (VSM) and SQUID (Superconducting Quantum Interference Device)

Learning Outcomes:

At the end of this unit, the student will be able to

- Explain the various types of electrical properties analysis techniques **L1**
- Classify the solar cells based on manufacturing material **L2**
- Explain the effect of magnetic field on the electrical properties **L2**
- Analyze the magnetization by using induction method **L2**
- Explain the construction and working principle of VSM **L2**
- Explain the construction and working principle of SQUID **L2**

Text Books:

1. Material Characterization: Introduction to Microscopic and Spectroscopic Methods – Yang Leng – John Wiley & Sons (Asia) Pvt. Ltd. 2008
2. Microstructural Characterization of Materials - David Brandon, Wayne D Kalpan, John Wiley & Sons Ltd., 2008.

Reference Books:

1. Fundamentals of Molecular Spectroscopy – IV Ed. – Colin Neville Banwell and Elaine M. McCash, Tata McGraw-Hill, 2008.
2. Elements of X-ray diffraction – Bernard Dennis Cullity & Stuart R Stocks, Prentice Hall ,2001 – Science.

Course Outcomes:

At the end of this Course the student will be able to

- Identify the various characterization techniques **L1**
- Classify the characterization techniques based on their applications and properties **L2**
- Apply the various characterization techniques for materials characterization. **L3**

B.Tech III Year II Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

19ABS44-Green Chemistry and Catalysis for sustainable Environment

(Open Elective-II)

L	T	P	C
3	0	0	3

Course Objectives:

Learn an interdisciplinary approach to the scientific and societal issues arising from industrial chemical production, including the facets of chemistry and environmental health sciences that can be integrated to promote green chemistry and the redesign of chemicals, industrial processes and products

Understand the use of alternatives assessments that combine chemical, environmental health, regulatory, and business considerations to develop safer products.

UNIT – 1: Principles and concepts of green chemistry **9 Hrs**

Introduction, Green chemistry Principles, sustainable development and green chemistry, atom economy, atom economic reactions: Rearrangement and addition reactions and un-economic reactions: Substitution, elimination and Wittig reactions, Reducing Toxicity. Waste - problems and Prevention: Design for degradation, Polymer recycling

Learning Outcomes:

At the end of this unit, the student will be able to

- Apply the Green chemistry Principles for day to day life as well as synthesis L3
- Describe the sustainable development and green chemistry L2
- Explain economic and un-economic reactions L2
- Demonstrate Polymer recycling L2

UNIT – II: : Catalysis and green chemistry **10Hrs**

Introduction to catalysis, Heterogeneous catalysts: Basics of Heterogeneous Catalysis, Zeolites and the Bulk Chemical Industry, Heterogeneous Catalysis in the Fine Chemical and Pharmaceutical Industries, Catalytic Converters, Homogeneous catalysis: Transition Metal ion Catalysis, Organo-catalysis, Greener Lewis Acids, Asymmetric Catalysis, Phase transfer catalysis: Hazard Reduction, Oxidation Using Hydrogen Peroxide, Bio-catalysis and photo-catalysis with examples

Learning Outcomes:

At the end of this unit, the student will be able to

- Explain Heterogeneous catalyst and its applications in Chemical and Pharmaceutical Industries L2
- Differentiate Homogeneous and Heterogeneous catalysis L2
- Identify the importance of Bio and Photo Catalysis L3
- Discuss Transition metal and Phase transfer Catalysis L3

UNIT – III: Organic solvents: environmentally benign solutions **7 Hrs**

Organic solvents and volatile organic compounds, solvent free systems, supercritical fluids: Super critical carbon dioxide, super critical water and water as a reaction solvent: water based coatings, Ionic liquids as catalysts and solvents

Learning Outcomes:

At the end of this unit, the student will be able to

- Demonstrate Organic solvents and importance of solvent free systems L3
- Discuss Super critical carbondioxide L2
- Explain Super critical water and water as a reaction solvent L2
- Interpret Ionic Liquids as Catalyst and Solvent L2

UNIT – IV: Emerging greener technologies and alternative energy sources **8 Hrs**

Biomass as renewable resource, solar power, other forms of renewable energy, introduction and applications of Fuel Cells, Chemicals from Renewable feedstocks: Chemicals from Fatty Acids, Polymers from Renewable Resources. The Syngas Economy, The Bio-refinery, Design for energy efficiency: Photochemical Reactions and Examples, advantages and Challenges.

Microwave-assisted Reactions-examples and applications, sono-chemical reactions- examples and applications.

Learning Outcomes:

At the end of this unit, the student will be able to

- Describe importance of Biomass and Solar Power L2
- Illustrate Sonochemistry and Green Chemistry L2
- Apply Green Chemistry for Sustainable Development L3
- Discuss the importance of Renewable resources L3

UNIT – V: Green processes for green nanoscience **8 Hrs**

Introduction and traditional methods in the nanomaterials synthesis, Translating green chemistry principles for practicing nanoscience. Green Synthesis of nanophase inorganic materials and metal oxide nanoparticles: microwave-assisted synthesis, green synthesis of metal and metal oxide nanoparticles, green chemistry applications of inorganic nanomaterials

Learning Outcomes:

At the end of this unit, the student will be able to

- Discuss green Chemistry Principles for practicing Green nano synthesis L3
- Illustrate Microwave Assisted Synthesis L2
- Differentiate Hydrothermal and Reflux synthesis L2
- Demonstrate Green Chemistry applications of Inorganic nanomaterials L2

Text Books:

1. M. Lancaster, Green Chemistry an introductory text, Royal Society of Chemistry, 2002.
2. Paul T. Anastas and John C. Warner, Green Chemistry Theory and Practice, 4th Edition, Oxford University Press, USA, 1997.

Reference Books:

1. Sanjay K. Sharma and AckmezMudhoo, Green Chemistry for Environmental Sustainability, First Edition, , CRC Press, 2010.
2. AlvisePerosa and Maurizio Selva, Hand Book of Green chemistry Volume 8: Green Nanoscience, wiley-VCH, 2013

Course Outcomes:

At the end of this Course the student will be able to

- Apply the Green chemistry Principles for day to day life as well as synthesis for sustainable development. L3
- Differentiate Homogeneous and Heterogeneous catalysis L2
- Demonstrate Organic solvents and importance of solvent free systems L2
- Describe importance of Biomass and Solar Power for green environment. L2
- Discuss green Chemistry Principles for practicing Green nano synthesis using Microwave Assisted technique. L3

B.Tech III Year II Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

19ABS45-Chemistry of Nanomaterials and applications

(Open Elective-II)

L	T	P	C
3	0	0	3

Course Objectives:

- To understand synthetic principles of Nanomaterials by various methods
- And also characterize the synthetic nanomaterials by various instrumental methods
- To enumerate the applications of nanomaterials in engineering

UNIT – 1: Introduction to nanoscience **8 Hrs**

Introduction, importance of nanomaterials, nanoscience in nature, classification of nanostructured materials, properties, scope of nanoscience and nanotechnology& applications.

Learning Outcomes:

At the end of this unit, the student will be able to

- Classify the nanostructure materials L2
- Describe scope of nanoscience and technology L2
- Explain different synthetic methods of nanomaterials L2
- Identify the synthetic methods of nanomaterial which is suitable for preparation of particular material L3

UNIT – II: : Synthesis of nanomaterials **10 Hrs**

Bottom-Up approach:- Sol-gel synthesis, micro emulsions or reverse micelles, co-precipitation method, solvothermal synthesis, hydrothermal synthesis.

Top-Down approach:- Arc discharge Plasma arc method, aerosol synthesis, ion sputtering, laser pyrolysis, laser ablation, chemical vapour deposition method, electro deposition method, and high energy ball milling.

Learning Outcomes:

At the end of this unit, the student will be able to

- Describe the top down approach L2
- Explain aerosol synthesis and plasma arc technique L2
- Differentiate chemical vapour deposition method and electrodeposition method L2
- Discuss about high energy ball milling L3

UNIT – III: Characterization nanomaterials **7 Hrs**

Techniques for characterization: Dynamic light scattering for particle size determination, Diffraction technique, electron microscopy techniques for the characterization of nanomaterials, BET method for surface area analysis

Learning Outcomes:

At the end of this unit, the student will be able to

- Discuss different technique for characterization of nanomaterial L3
- Explain electron microscopy techniques for characterization of nanomaterial L3
- Describe BET method for surface area analysis L2
- Apply different spectroscopic techniques for characterization L3

UNIT – IV: Structural studies of nanomaterials **8 Hrs**

Properties of nanomaterials: fullerenes, carbon nanotubes, core-shell nanoparticles. Nano-crystalline materials, magnetic nanoparticles and important properties in relation to nano-magnetic materials, thermoelectric materials, non-linear optical materials, liquid crystals

Learning Outcomes:

At the end of this unit, the student will be able to

- Explain synthesis and properties and applications of nanaomaterials **L2**
- Discuss about fullerenes and carbon nanotubes **L3**
- Differentiate nanomagnetic materials and thermoelectric materials **L2**
- Describe liquid crystals **L2**

UNIT – V: Applications of Nanomaterials **7 Hrs**

Engineering, medicine, aerospace applications of nanomaterials

Learning Outcomes:

At the end of this unit, the student will be able to

- Illustrate applications of nanaomaterials **L2**
- Discuss the magnetic applications of nanomaterials **L3**
- List the applications of non-linear optical materials **L1**
- Describe the applications fullerenes, carbon nanotubes **L2**

Text Books:

1. NANO: The Essentials: T Pradeep, MaGraw-Hill, 2007
2. Textbook of Nanoscience and nanotechnology: B S Murty, P Shankar, BaldevRai, BB Rath and James Murday, Univ. Press, 2012

Reference Books:

1. Ludovico Cademrtiri and Geoffrey A. Ozin& Geoffrey A. Ozin, Concepts of Nanochemistry; Wiley-VCH, 2011.
2. Guozhong Cao, Nanostructures & Nanomaterials; Synthesis, Properties & Applications: Imperial College Press, 2007
3. C. N. R. Rao, Achim Muller, K.Cheetham, Nanomaterials Chemistry, , Wiley-VCH, 2007

Course Outcomes:

At the end of this Course the student will be able to

- Understand the state of art synthesis of nano materials **L1**
- Characterize nano materials using ion beam, scanning probe methodologies, position sensitive atom probe and spectroscopic ellipsometry. **L2**
- Analyze nanoscale structure in metals, polymers and ceramics **L3**
- Analyze structure-property relationship in coarser scale structures **L3**
- Understand structures of carbon nano tubes **L1**

Department of Chemistry *R19*

B.Tech III Year II Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

19ABS46-Environmental Management and Audit

(Open Elective-II)

L	T	P	C
3	0	0	3

Course Objectives:

- To make the student understand evolution of LCA, stages in product LCA, procedure and applications for LCA.
- To understand the EMS core elements, benefits, certification, ISO 14000 series, evolution, principles, structure.
- To impart knowledge on environmental monitoring, modelling, technology assessment, risk assessment.
- Understand necessity of environmental design, principles, benefits, strategies.
- To understand types of audit, general audit methodology, audit process and apply the various domestic, industrial activities.

UNIT – 1: Life Cycle Assessment (LCA): **8 Hrs**

Evolution, stages, a code of good conduct for LCA, procedure for LCA-goal and scope, analyzing the inventory, assessing the environmental impact, evaluating environmental profiles, applications in government & private Sector

Learning Outcomes:

At the end of this unit, the student will be able to

- Illustrate code of good conduct for LCA **L2**
- Discuss scope, analyzing the inventory and assessing the environmental impact **L3**
- List evolution and stages of LCA **L1**
- Describe the applications in government & private Sector **L2**

UNIT – II: Environmental Management System Standards: **8 Hrs**

Environmental Management Systems – Core Elements, benefits, certification and documentation, EMS Standards – ISO 14000 series – evolution, principles, structure, supporting systems, specification standards, implementation and benefits of Implementing

Learning Outcomes:

At the end of this unit, the student will be able to

- Explain Environmental Management Systems **L3**
- Describe EMS Standards – ISO 14000 series **L2**
- Apply Environmental Management Systems for certification and documentation **L3**

UNIT – III: Environmental Monitoring, Modeling& Risk Assessment **8 Hrs**

Forecasting & Growth modeling, sensitivity Analysis, Applications of remote sensing and GIS, Environmental technology Assessment. Environmental risk assessment in industry, ecosystem approach to risk assessment, Eco-Mapping, Environmental Education

Learning Outcomes:

At the end of this unit, the student will be able to

- Illustrate Applications of remote sensing and GIS in Environmental assessment **L2**
- Discuss environmental risk assessment in industry **L3**
- List ecosystem approach to risk assessment, Eco-Mapping, Environmental Education **L1**

UNIT – IV: Environmental Design & Economics **10 Hrs**

Principles, Benefits, Motivation, ED for manufactured products- Considerations in product life stages, Tools for products, Eco-labelling, ED for Building – Principles and Strategies for green building construction, ED for development and planning.

Economics and Environment -environmental cost, benefits, taxes, accounting, environmental Valuation – categorization and valuation techniques.

Learning Outcomes:

At the end of this unit, the student will be able to

- Describe principles, benefits and motivation of environmental Design for manufactured products **L2**
- Explain principles and Strategies for green building construction **L2**
- Differentiate ED for Building cost, benefits and taxes **L2**
- Discuss about categorization and valuation techniques w.r.t economics and environment **L3**

UNIT – V: Environmental Auditing **8 Hrs**

Objectives, Scope, types, Basic structure and steps of EA, Elements of Audit process – What, Who, Why, How, Waste audits, EA in industrial projects, Liability audit and site assessment.

Learning Outcomes:

At the end of this unit, the student will be able to

- Illustrate Basic structure and steps of environmental auditing **L2**
- Discuss environmental auditing in industrial projects in terms of liability audit and site assessment **L3**
- List Scope and types environmental auditing **L1**

Text Books:

1. Environmental Management, Vijay Kulkarni & T. V. Ramachandra, Capital Publishing Company, New Delhi, 2006.
2. Concepts of Environmental Management for Sustainable Development, M.C. Dash, Wiley Publications, 2019.

Reference Books:

1. Ajith Sankar, Environmental Management, OXFORD publications, 2015
2. Ni Bin Chang, Systems Analysis for Sustainable Engineering: Theory and Applications, Tata McGraw-Hill Publications, 2006.
3. Gary Skinner, Ken Crafer, Environmental Management, , Cambridge, IGCSE, 2017

Course Outcomes:

At the end of this Course the student will be able to

- Classify the stages in LCA with goal and procedures **L2**
- Describe the structure of EMS, Explain benefits of EMS, Differentiate core elements of EMS, Discuss about certification of ISO 14000 series. **L2**
- Discuss Forecasting & Growth modeling and Ecosystem Approach to Risk Assessment and Environmental Education. **L3**
- Explain Principles and Strategies for green building construction. **L2**
- Illustrate Objectives, Scope of Environmental auditing, elements of Audit process, liability audit and site assessment. **L2**

B.Tech III Year II Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

19ACE65a-REMOTE SENSING AND GIS

(Open Elective-II)

L	T	P	C
3	0	0	3

Course Objectives: The objectives of the course are to make the students learn about

- Introduce the basic principles of Remote Sensing and GIS techniques.
- Teach various types of satellite sensors and platforms
- Impart concepts of visual and digital image analyses
- Teach concepts of principles of spatial analysis
- Teach about the application of RS and GIS in Civil engineering

UNIT – I:

Introduction to photogrammetry: Principles & types of aerial photograph, geometry of vertical aerial photograph, Scale & Height measurement on single vertical aerial photograph, Height measurement based on relief displacement, Fundamentals of stereoscopy, fiducially points, parallax measurement using fiducially line.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand concepts of photogrammetry
- Estimate heights and distances.

UNIT – II:

Remote sensing: Basic concepts and foundation of remote sensing – elements involved in remote sensing, electromagnetic spectrum, remote sensing terminology and units. Energy resources, energy interactions with earth surface features and atmosphere, resolution, sensors and satellite visual interpretation techniques, basic elements, converging evidence, interpretation for terrain evaluation, spectral properties of water bodies, introduction to digital data analysis.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand advantages of remote sensing
- Demonstrate concepts of remote sensing.

UNIT – III:

Geographic information system: Introduction, GIS definition and terminology, GIS categories, components of GIS, fundamental operations of GIS, A theoretical framework for GIS. Data collection and input overview, data input and output. Keyboard entry and coordinate geometry procedure, manual digitizing and scanning, Raster GIS, Vector GIS – File management, Spatial data – Layer based GIS, Feature based GIS mapping.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand concepts of GIS.
- Explain data collection and data interpretation
- Develop terrain characteristics using Mapping

UNIT – IV:

GIS spatial analysis: Computational Analysis Methods (CAM), Visual Analysis Methods (VAM), Data storage-vector data storage, attribute data storage, overview of the data manipulation and analysis. Integrated analysis of the spatial and attribute data.

Learning Outcomes:

At the end of this unit, the student will be able to

- Know applications of GIS and data interpretation.

UNIT – V:

Water resources applications: Land use/Land cover in water resources, Surface water mapping and inventory -Watershed management for sustainable development and Watershed characteristics - Reservoir sedimentation, Fluvial Geomorphology - Ground Water Targeting, Identification of sites for artificial Recharge structures - Inland water quality survey and management, water depth estimation and bathymetry.

Learning Outcomes:

At the end of this unit, the student will be able to

- Know applications of RS & GIS in water resources applications.
- Study technological problems like reservoir sedimentation ground water identification

Text Books:

1. Remote Sensing and GIS by B.Bhatta, Oxford University Press,NewDelhi
2. Advanced surveying : Total station GIS and remote sensing – Satheesh Gopi – Pearson publication.

Reference Books:

1. Fundamentals of remote sensing by gorge Joseph , Universities press, Hyderabad.
2. Concepts & Techniques of GIS by C.P.Lo Albert, K.W. Yonng, Prentice Hall(India) Publications
3. Basics of Remote sensing & GIS by S.Kumar, Laxmi Publications
4. Remote sensing and GIS by M.Anjireddy , B.S.Pubiliications, NewDelhi
5. Remote Sensing and its applications by LRA Narayana University Press1999
6. GIS by Kang – tsungchang, TMH Publications &Co
7. Principals of Geo physical Information Systems – Peter A Burragh and Rachael Mc Donnell Oxford Publishers2004

Course Outcomes:

At the end of this Course the student will be able to

- Comparing with ground, air and satellite based sensor platforms.
- Interpret the aerial photographs and satellite imageries.
- Create and input spatial data for GIS application.
- Apply RS and GIS concepts in water resources engineering.
- Applications of various satellite data.

B.Tech III Year II Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

19ACE65b-ENVIRONMENTAL IMPACT ASSESTMENT & MANAGEMENT

(Open Elective-II)

L	T	P	C
3	0	0	3

Course Objectives: The objectives of the course are to make the students learn about

- To impart knowledge on different concepts of Environmental Impact Assessment
- To teach procedures of risk assessment
- To teach the EIA methodologies and the criterion for selection of EIA methods
- To teach the procedures for environmental clearances and audit

UNIT – I:

INTRODUCTION: Basic concept of EIA : Initial environmental Examination, Elements Of EIA, - factors affecting E-I-A Impact evaluation and analysis, preparation of Environmental Base map, Classification of environmental parameters.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand the elements of EIA

UNIT – II:

EIA METHODOLOGIES:-

E I A Methodologies: introduction, Criteria for the selection of EIA Methodology, E I A methods, Ad-hoc methods, matrix methods, Network method Environmental Media Quality Index method, overlay methods and cost/benefit Analysis.

Learning Outcomes:

At the end of this unit, the student will be able to

- Explain the criteria for selection of EIA methodology

UNIT – III:

IMPACT OF DEVELOPMENTAL ACTIVITIES AND LAND USE:-

Introduction and Methodology for the assessment of soil and ground water, Delineation of study area, Identification of actives. Procurement of relevant soil quality, Impact prediction, Assessment of Impact significance, Identification and Incorporation of mitigation measures. E I A in surface water, Air and Biological environment: Methodology for the assessment of Impacts on surface water environment, Air pollution sources, Generalized approach for assessment of Air pollution Impact.

Learning Outcomes:

At the end of this unit, the student will be able to

- Study the factors causing impact of development activities
- Decide mitigation measures of pollution on environment

UNIT – IV:

ASSEMENT OF IMPACT ON VEGETATION AND WILDLIFE :

Introduction - Assessment of Impact of development Activities on Vegetation and wildlife, environmental Impact of Deforestation – Causes and effects of deforestation.

ENVIRONEMNTAL AUDIT :

Introduction - Environmental Audit & Environmental legislation objectives of Environmental Audit, Types of environmental Audit, Audit protocel, stages of Environmental Audit, onsite activities, evaluation of Audit data and preparation of Audit report

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand effect of development activities on environment.
- Know the design procedures for assessment of environmental risk

- Learn about the process of environmental auditing.
- Understand procedures for preparation of environmental audit report

UNIT – V:

ENVIRONEMENTAL ACTS (PROTECTION AND PREVENTION)

Post Audit activities, The Environmental protection Act, The water preventation Act, The Air (Prevention & Control of pollution Act.), and Wild life Act. Case studies and preparation of Environmental Impact assessment statement for various Industries.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand the importance of environmental protection acts
- Explain acts and notifications in Environmental legislation

Text Books:

1. Environmental Impact Assessment Methodologies, by Y. Anjaneyulu, B.S. Publication, Sultan Bazar, Hyderabad.
2. Environmental Science and Engineering, by J. Glynn and Gary W. Hein Ke – Prentice Hall Publishers

Reference Books:

1. Environmental Science and Engineering, by Suresh K. Dhaneja – S.K.,Katari& Sons Publication., NewDelhi
2. Environmental Pollution and Control, by Dr H.S. Bhatia – Galgotia Publication (P) Ltd, Delhi

Course Outcomes:

At the end of this Course the student will be able to

- Understand the concept of Environmental impact
- Understand the methodologies related to EIA
- Appreciate various laws related to environmental protection
- Prepare the environmental impact assessment statement and to evaluate it.

B.Tech III Year II Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

19ACE65c-DISASTER MANAGEMENT AND MITIGATION

(Open Elective-II)

L	T	P	C
3	0	0	3

Course Objectives: The objectives of the course are to make the students learn about

- Develop an understanding of why and how the modern disaster manager is involved with pre-disaster and post-disaster activities
- Develop an awareness of the chronological phases of natural disaster response and refugee relief operations. Understand how the phases of each are parallel and how they differ
- Understand the 'relief system' and the 'disaster victim.'
- Describe the three planning strategies useful in mitigation.
- Identify the regulatory controls used in hazard management.
- Describe public awareness and economic incentive possibilities.
- Understand the tools of post-disaster management

UNIT – I:

Environmental Hazards & Disasters: Meaning of Environmental hazards, Environmental Disasters and Environmental stress. Concept of Environmental Hazards, Environmental stress & Environmental Disasters. Different approaches & relation with human Ecology - Landscape Approach - Ecosystem Approach - Perception approach - Human ecology & its application in geographical researches

Learning Outcomes:

At the end of this unit, the student will be able to

- To know about the natural hazards and its management
- To understand about the global warming, cyclones and tsunamis

UNIT – II:

Classification of hazards & Disasters: Natural hazards and Disasters - Man Made hazards & Disasters - Planetary Hazards/ Disasters - Extra Planetary Hazards/ disasters - Planetary Hazards- Endogenous Hazards - Exogenous Hazards

Learning Outcomes:

At the end of this unit, the student will be able to

- Differentiate different types of hazards
- Understand different consequences of hazards

UNIT – III:

Endogenous Hazards - Volcanic Eruption – Earthquakes – Landslides - Volcanic Hazards/ Disasters - Causes and distribution of Volcanoes - Hazardous effects of volcanic eruptions - Environmental impacts of volcanic eruptions - Earthquake Hazards/ disasters - Causes of Earthquakes - Distribution of earthquakes - Hazardous effects of - earthquakes - Earthquake Hazards in India - - Human adjustment, perception & mitigation of earthquake

Learning Outcomes:

At the end of this unit, the student will be able to

- understand about earthquakes and volacanicerruptions
- Understand effects of earthquakes and mitigation measures

UNIT – IV:

Exogenous hazards/ disasters - Infrequent events- Cumulative atmospheric hazards/ disasters
Infrequent events: Cyclones – Lightning – Hailstorms Cyclones: Tropical cyclones & Local storms - Destruction by tropical cyclones & local storms (causes , distribution human adjustment, perception & mitigation)Cumulative atmospheric hazards/ disasters : - Floods- Droughts- Cold waves- Heat waves.Floods:- Causes of floods- Flood hazards India- Flood control measures (Human adjustment, perception & mitigation).Droughts:- Impacts ofdroughts- Drought hazards in India- Drought control measures- Extra Palnetary Hazards/ Disasters- Man induced Hazards /Disasters- Physical hazards/ Disasters

Learning Outcomes:

At the end of this unit, the student will be able to

- Obtain knowledge on exogenous hazards and causes
- Obtain knowledge on mitigation measures of cyclones, droughts etc.,

UNIT – V:

Soil Erosion:-- Mechanics & forms of Soil Erosion- Factors & causes of Soil Erosion- Conservation measures of Soil Erosion.Chemical hazards/ disasters:-- Release of toxic chemicals, nuclear explosion- Sedimentation processes.Sedimentation processes:- Global Sedimentation problems- Regional Sedimentation problems- Sedimentation & Environmental problems- Corrective measures of Erosion & Sedimentation-Biological hazards/ disasters:- Population Explosion.

Emerging approaches in Disaster Management- Three Stages

1. Pre- disaster stage(preparedness)-HVRA Atlas
2. Emergency Stage
3. Post Disaster stage-Rehabilitation

Learning Outcomes:

At the end of this unit, the student will be able to

- Knowledge on soil erosion and its effects
- education related to risk reduction in communities in post and pre stage

Text Books:

1. Disaster Management by Rajib Shah, Universities Press, India,2003
2. Disaster Mitigation: Experiences And Reflections by PardeepSahni
3. Natural Hazards & Disasters by Donald Hyndman & David Hyndman – Cengage Learning
4. National Disaster Management Authority-Guidelines

Reference Books:

1. Kates,B.I& White, G.F The Environment as Hazards, oxford, New York, 1978
2. R.B. Singh (Ed) Disaster Management, Rawat Publication, New Delhi, 2000
3. H.K. Gupta (Ed) Disaster Management, Universiters Press, India, 2003
4. R.B. Singh, Space Technology for Disaster Mitigation in India (INCED), University of Tokyo,1994
5. Dr. Satender, Disaster Management in Hills, Concept Publishing Co., New Delhi

B.Tech III Year II Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

19AEE65a- ENERGY CONSERVATION & MANAGEMENT

(Open Elective-II)

L	T	P	C
3	0	0	3

Course Objectives: The objectives of the course are to make the students learn about

- To understand energy efficiency, scope, conservation and technologies.
- To design energy efficient lighting systems.
- To estimate/calculate power factor of systems and propose suitable compensation Techniques.
- To understand energy conservation in HVAC systems.
- To calculate life cycle costing analysis and return on investment on energy efficient Technologies.

UNIT – I: **09 Hrs**

Basic Principles of Energy Audit and management Energy audit – Definitions – Concept– Types of audit – Energy index – Cost index – Pie charts – Sankey diagrams – Load profiles – Energy conservation schemes and energy saving potential – Numerical problems – Principles of energy management – Initiating, planning, controlling, promoting, monitoring, reporting – Energy manager – Qualities and functions – Language – Questionnaire – Check list for top management.

Learning Outcomes:

At the end of this unit, the student will be able to

- To know about various types of Energy Audit **L1**
- To know about various types of Energy conservation schemes and Energy Manager functions **L2**

UNIT – II: **09 Hrs**

Lighting Modification of existing systems – Replacement of existing systems – Priorities: Definition of terms and units – Luminous efficiency – Polar curve – Calculation of illumination level – Illumination of inclined surface to beam – Luminance or brightness – Types of lamps – Types of lighting – Electric lighting fittings (luminaries) – Flood lighting – White light LED and conducting Polymers – Energy conservation measures

Learning Outcomes:

At the end of this unit, the student will be able to

- To know about various Lighting systems and types of lamps. **L1**
- To evaluate illumination level Illumination of inclined surface to beam and Design of Energy efficient lighting systems. **L2**

UNIT – III: **09 Hrs**

Power Factor and energy instruments Power factor – Methods of improvement – Location of capacitors – Power factor with non linear loads – Effect of harmonics on Power factor – Numerical problems. Energy Instruments – Watt–hour meter – Data loggers – Thermocouples – Pyrometers – Lux meters – Tong testers – Power analyzer.

Learning Outcomes:

At the end of this unit, the student will be able to

- To know about various Methods of Power Factor improvement **L1**
- To know about various Energy Instruments **L3**

UNIT – IV: **09 Hrs**

Space Heating and Ventilation Ventilation – Air–Conditioning (HVAC) and Water Heating: Introduction – Heating of buildings – Transfer of Heat–Space heating methods – Ventilation and air–conditioning – Insulation–Cooling load – Electric water heating systems – Energy conservation methods

Learning Outcomes:

At the end of this unit, the student will be able to

- To know about analysis of Heating and HVAC **L1**
- To know about Energy conservation methods **L2**

UNIT – V: **09 Hrs**

Economic Aspects and Analysis Economics Analysis – Depreciation Methods – Time value of money – Rate of return – Present worth method – Replacement analysis – Life cycle costing analysis – Energy efficient motors (basic concepts).Computation of Economic Aspects Calculation of simple payback method – Net present worth method – Power factor correction – Lighting – Applications of life cycle costing analysis – Return on investment.

Learning Outcomes:

At the end of this unit, the student will be able to

- To know about basic concept of Analysis of Economics and different methods **L1**
- To know about Computation of Economic Aspects Calculation **L2**

Text Books:

1. Energy management by W.R. Murphy & G. Mckay Butter worth, Elsevier publications. 2012
2. Energy efficient electric motors by John.C.Andreas, Marcel Dekker Inc Ltd-2nd edition,1995.

Reference Books:

1. Electric Energy Utilization and Conservation by S C Tripathy, Tata McGraw hill publishing company Ltd. New Delhi.
2. Energy management by Paul o' Callaghan, Mc–Graw Hill Book company–1stedition, 1998.
3. Energy management hand book by W.C.Turner, John wiley and sons.
4. Energy management and conservation –k v Sharma and pvenkata seshaiah-I K International Publishing House pvt.ltd, 2011.
5. http://www.energymanagertraining.com/download/Gazette_of_IndiaP art IISecI-37_25-08-2010.pdf

Course Outcomes:

At the end of this Course the student will be able to

- Explain energy efficiency, conservation and various technologies. **L1**
- Design energy efficient lighting systems. **L2**
- Calculate power factor of systems and propose suitable compensation techniques. **L3**
- Explain energy conservation in HVAC systems. **L4**
- **L5**

B.Tech III Year II Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

19AEE65b- PLC AND ITS APPLICATIONS

(Open Elective-II)

L	T	P	C
3	0	0	3

Course Objectives: The student will be able to:

- Understand the basic functions and types of PLCs
- Get exposure of Easy Veep software, its applications
- Classification of PLCs and applications
- Programming using PLCs
- Troubleshooting aspects using PLCs

UNIT – I: Introduction

Basic functions of PLCs, Mechanical relays versus PLC, Different types of PLC's – Allen- Bradley – Micrologix: ML1000, ML1100, SLC500, Compact Logix, Mitsubishi FX series, HMI's, Processor and I/O cards

Learning Outcomes:

At the end of this unit, the student will be able to

- To understand about basic functions of PLCs & classification of PLCs **L1**
- To distinguish between PLCs and Mechanical relays **L2**
- To know about Processor and I/O cards

UNIT – II: **10 Hrs**

Introduction to Easy Veep software, Link between mechanical, electrical and programming documentation, Logic diagrams, Flip-Flop Logic, M8000, M8001 internal bits interpretation, Binary code, data table, manipulation and search engine in Mitsubishi environment Communication between PC and PLC, Communication between PC and HMI, PLC and HMI Serial Local network, Introduction to SLC500

Learning Outcomes:

At the end of this unit, the student will be able to

- To know about Easy Veep software & about Logic diagrams **L1**
- To understand about Search engine & interfacing of PC and PLCs **L2**

UNIT – III: PLC software and applications **10 Hrs**

Boolean algebra – understanding binary code, ADD and SUB functions, UP and Down Counters, Introduction to k1Y0, MOV function, CPR and ZCP functions, SHWT and SHRD instructions, Introduction to Absolutely Drum Instruction.

Allen Bradley PLC: Introduction to Rockwell Software, Hardware focus, Hardware considerations (Field wiring, Master Control Relay, VFD), Basic programming and applications, Cascade control – subroutine, Different programs.

Learning Outcomes:

At the end of this unit, the student will be able to

- To know about basic features of PLCs & various instructions of PLC **L1**
- To know about various PLC versions & understand about Cascade control and subroutines **L2**

UNIT – IV: Programming instructions **10 Hrs**

Instructions and binary interpretation, Bit Instruction, Timers and counters, Comparison instructions, Programming Instructions – Math instructions, Move and Logical Instructions, Discussions of programming, communications for PLC-Robotic arm, Exercise of setup and monitoring

Learning Outcomes:

At the end of this unit, the student will be able to

- To know about various Programming instructions & understand Math instructions in PLCs **L1**
- To know about Logical instructions & understand about Communications with PLC using set up and monitoring **L2**

UNIT – V: Analog and Digital parameters **10 Hrs**

Analog and Digital parameters by using SLC5/03-VFD-Panel Mate series 1700, Practical Troubleshooting, troubleshooting technique, Control system stability and tuning basics. Applications: Process to rewind, test, and integrate with extrusion process for wiring and fibre optic industries, Food industry – yeast, flour distribution and control. Process Medical equipment Industry – Gas analyzer, Leak tester (using CO2), plastic wrapping machines etc.

Learning Outcomes:

At the end of this unit, the student will be able to

- To know about analog and digital parameters in certain PLCs & apply PLCs for control system stability aspects **L1**
- To know about troubleshooting techniques & identify few applications of PLCs in Science and Technology fields **L2**

Text Books:

1. Automating manufacturing systems with PLCs by Hugh Jack, 2010.
2. PLC Hand Book (Automation direct Siemens)

Reference Books:

1. Programmable Logic Controllers by R. Bliesener, F Ebel, Festo. Didactic publishers,2002.
2. Programmable Logic Controllers by W. Bolton, 4th Edition, Newnes, 2006.
3. Introduction to PLCs by Jay F. Hooper, 2nd Edition, Carolina Academic Press, 2006.

Course Outcomes:

At the end of this Course the student will be able to

- Understand different types of PLCs **L1**
- Understand the usage of Easy Veep software **L2**
- Understand the hardware details of Allen Bradley PLC **L3**
- Programming of PLCs **L4**
- Know about few applications of PLCs in different fields of Science and Technology **L5**

B.Tech III Year II Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

19AEE65c- SYSTEM RELIABILITY CONCEPTS

(Open Elective-II)

L	T	P	C
3	0	0	3

Course Objectives: The objectives of the course are to make the students learn about

- The Basic concepts, rules for combining probabilities of events, failure density and distribution functions.
- Evaluation of network Reliability / Unreliability and types of redundancies.
- Evaluation of network Reliability / Unreliability using conditional probability method.
- Expected value and standard deviation of Exponential distribution and Measures of reliability.
- Evaluation of Limiting State Probabilities of one, two component repairable models.

UNIT – I: Basic Probability Theory **09 Hrs**

Basic concepts – Rules for combining Probabilities of events – Failure Density and Distribution functions -- Bernoulli's trials – Binomial distribution – Expected value and standard deviation for binomial distribution – Examples.

Learning Outcomes:

At the end of this unit, the student will be able to

- To know about basic rules for probabilities of events **L1**
- Get detailed information about Probability of failure density and distribution Functions and obtain the expected value and standard deviation for binomial distribution. **L2**

UNIT – II: Network Modeling and Reliability Evaluation **09 Hrs**

Basic concepts – Evaluation of network Reliability / Unreliability – Series systems, Parallel systems, Series - Parallel systems, partially redundant systems – Types of redundancies - Evaluation of network Reliability / Unreliability using conditional probability method – Paths based and Cutset based approach – complete event tree and reduced event tree methods - Examples.

Learning Outcomes:

At the end of this unit, the student will be able to

- How to find the Probability of success and failures of network using different approaches for series-parallel configurations. **L1**
- To find reliability / unreliability of complex systems using different methods **L2**

UNIT – III: Time Dependent Probability **09 Hrs**

Basic concepts -- Reliability functions f(t), Q(t), R(t), h(t) -- Relationship between these functions – Bath tub curve – Exponential failure density and distribution functions - Expected value and standard deviation of Exponential distribution – Measures of reliability – MTTF, MTTR, MTBF – Evaluation of network reliability / Unreliability of simple Series, Parallel, Series-Parallel systems - Partially redundant systems - Evaluation of reliability measure – MTTF for series and parallel systems – Examples.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand the concepts of time domain functions and relationship between them. and obtain the expected value and standard deviation for exponential distribution. **L1**
- To obtain probabilistic measures for fully redundant and partially redundant configurations **L2**

UNIT – IV: Discrete Markov Chains & Continuous Markov Processes **09 Hrs**

Markov Chains: Basic concepts – Stochastic transitional Probability matrix – time dependent probability evaluation – Limiting State Probability evaluation – Absorbing states.

Markov Processes: Modeling concepts – State space diagrams – time dependent reliability evaluation of single component repairable model – Evaluation of Limiting State Probabilities of one, two component repairable models – Frequency and duration concepts – Frequency balance approach - Examples.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand the concepts of Stochastic Transitional Probability Matrix, Limiting State Probability **L1**
- Understand the concept of Frequency balance approach. And To distinguish between Markov chains and Markov processes **L2**

UNIT – V: Multi Component & Approximate System Reliability Evaluation **09 Hrs**

Recursive relation for evaluation of equivalent transitional rates– cumulative probability and cumulative frequency and 'n' component repairable model – Series systems, Parallel systems, Basic probability indices – Series, Parallel systems – Complex Systems– Cutset approach – Examples.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand the concepts of recursive relation for evaluation of equivalent transitional rates. **L1**
- To know about computation of basic probability indices for series, parallel configurations **L2**

Text Books:

1. Reliability Evaluation of Engineering Systems by Roy Billinton and Ronald N. Allan, Reprinted in India B. S. Publications, 2007.
2. Reliability Engineering by E. Balagurusamy, Tata McGraw Hill, 2003.

Reference Books:

1. Introduction to Reliability Engineering by E. E. Lewis by Wiley Publications.
2. Reliability and Maintainability Engineering by Charles E. Ebeling, Tata McGraw Hill, 2000.
3. Reliability and Safety Engineering by Ajit Kumar Verma, SrividyaAjit and Durga Rao Karanki, Springer, Second Edition, 2016. System Reliability Theory Marvin Rausand and ArnljotHoyland, Wiley Publictions.

Course Outcomes:

At the end of this Course the student will be able to

- Understand the concepts for combining Probabilities of events, Bernoulli's trial, and Binomial distribution. **L1**
- Network Reliability/Unreliability using conditional probability, path and cutest based approach, complete event tree and reduced event tree methods. **L2**
- Understanding Reliability functions and to develop relationship between these functions, expected value and standard deviation of Exponential distribution and measures of reliabilities. **L3**
- Analyze the time dependent reliability evaluation of single component repairable model, frequency and duration concepts, Frequency balance approach. **L4**
- `Recursive relation for evaluation of equivalent transitional rates, cumulative probability and cumulative frequency and 'n' component repairable model. **L5**

B.Tech III Year II Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

19AME65a- AUTOMOBILE ELECTRONICS, SENSORS AND DRIVES

(Open Elective-II)

L	T	P	C
3	0	0	3

Course Objectives: The objectives of the course are to make the students learn about

- Explain the use of electronics in the automobile.
- Explain the importance of various types of sensors and actuators in automotive electronics.
- Demonstrate the various control elements in Engine Management system.
- Familiarize with Vehicle management systems.
- Identify various electronic and the instrumentation systems used in automobile.

UNIT – 1: Introduction to microcomputer: **10 Hrs**

Microcomputer: Buses, memory, timing, CPU registers; Microprocessor architecture: Initialization, operation codes, program counter, branch and jump instructions, subroutine. Analog to digital converters and Digital to analog converters, sampling, polling and interrupts, digital filters, lookup table.

Learning Outcomes:

At the end of this unit, the student will be able to

- Draw the architecture of microprocessor. **L3**
- Explain the importance of subroutines, branch and jump instructions in Microprocessor. **L3**
- Compare Analog to Digital Converters and Digital to Analog Converters. **L4**
- Identify the various components of Microcomputer. **L1**

UNIT – II: Sensors and actuators **10 Hrs**

Speed sensors, Pressure sensors: Manifold Absolute Pressure sensor, knock sensor, Temperature sensors: Coolant and Exhaust gas temperature, Exhaust Oxygen level sensor, Position sensors: Throttle position sensor, accelerator pedal position sensor and crankshaft position sensor, Air mass flow sensor. Solenoids, stepper motors and relays.

Learning Outcomes:

At the end of this unit, the student will be able to

- Recall the working principles of various types of sensors used in automotive electronics. **L1**
- Identify the practical applications of sensors and actuators. **L2**
- Apply the concept of sensors and actuators in real world applications **L3**

UNIT – III: Electronic engine management system **10Hrs**

Electronic engine control: Input, output and control strategies, electronic fuel control system, fuel control modes: open loop and closed loop control at various modes, EGR control, Electronic ignition systems – Spark advance correction schemes, fuel injection timing control.

Learning Outcomes:

At the end of this unit, the student will be able to

- Compare open loop and closed loop control systems. **L4**
- Identify the various elements in Engine Management System. **L2**
- Recall the concepts of electronic ignition system. **L1**

UNIT – IV: Electronic vehicle management system **8 Hrs**

Cruise control system, Antilock braking system, electronic suspension system, electronic steering control, traction control system, Transmission control, Safety: Airbags, collision avoiding system, low tire pressure warning system.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand the importance of cruise control system. **L2**
- Outline working of the safety systems. **L1**
- Demonstrate the control of electronic steering and traction. **L2**

UNIT – V: Automotive instrumentation system: **8 Hrs**

Input and output signal conversion, multiplexing, fuel quantity measurement, coolant temperature and oil pressure measurement, display devices- LED, LCD, VFD and CRT, Onboard diagnostics(OBD), OBD-II, off board diagnostics.

Learning Outcomes:

At the end of this unit, the student will be able to

- Explain the method of measurement of fuel quality. **L2**
- Compare onboard diagnostics and off board diagnostics. **L4**
- Discuss various types of display devices. **L2**

Text Books:

1. Understanding Automotive Electronics, William B Ribbens, Newne Butterworth-Heinermann, 6th edition 2003.
2. Crouse W H, Automobile Elctrical Equipment, McGraw Hill Book Co.Inc, Newyork 2005.

Reference Books:

1. Bechhold "Understanding Automotive Electronics", SAE, 1998.
2. Robert Bosch "Automotive Hand Book", SAE (5th Edition), 2000.
3. Tom Denton,"Automobile Electrical and Electronic Systems" 3rd edition- Edward Arnold, London - 2004.
4. Eric Chowanietz - 'Automotive Electronics' - SAE International USA – 1995.

Course Outcomes:

At the end of this Course the student will be able to

- Obtain an overview of automotive components, like sensors, actuators, communication protocols and safety systems employed in today's automotive industry. **L1**
- Interface automotive sensors and actuators with microcontrollers. **L3**
- Know, the various display devices that are used in automobiles. **L2**
- Identify the elements in the engine management and vehicle management system. **L2**

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B.Tech III Year I Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

19AME65b- PROGRAMMING OF ROBOT AND ITS CONTROL

(Open Elective - II)

L	T	P	C
3	0	0	3

Course Objectives: The objectives of the course are to make the students learn about

- Learn the fundamental concepts of industrial robotic technology.
- Apply the basic mathematics to calculate kinematic and dynamic forces in robot manipulator.
- Understand the robot controlling and programming methods.
- Describe concept of robot vision system.

UNIT – 1: Fundamentals of Robots: **10 Hrs**

Introduction, definition, classification and history of robotics, robot characteristics and precision of motion, advantages, disadvantages and applications of robots.

Learning Outcomes:

At the end of this unit, the student will be able to

- Outline the advantages, disadvantages and applications of robot. **L2**
- Compare the types of robot manipulators based on applications. **L2**

UNIT – II: Robot Actuators And Feedback Components: **10 Hrs**

Actuators, Pneumatic, Hydraulic actuators, Electric & Stepper motors, comparison. Position sensors - potentiometers, resolvers, encoders - velocity sensors, Tactile sensors, Proximity sensors.

Learning Outcomes:

At the end of this unit, the student will be able to

- Compare the types of actuators used in robot manipulator. **L2**
- List out the various types of robots and feedback components. **L2**

UNIT – III: Robot Programming **10Hrs**

Methods of programming - requirements and features of programming languages, software packages, problems with programming languages. VAL, RAIL, AML, C, C++.

Learning Outcomes:

At the end of this unit, the student will be able to

- List out the various methods of robot programming **L2**
- Explain the requirements and features of programming **L2**

UNIT – IV: Control of Manipulators: **8 Hrs**

Open- and close-loop control, the manipulator control problem, linear control schemes, characteristics of second-order linear systems, linear second-order SISO model of a manipulator joint, joint actuators, partitioned PD control scheme, PID control Scheme, computer Torque control, force control of robotic manipulators, description of force-control tasks, force control strategies, hybrid position/force control, impedance force/torque control.

Learning Outcomes:

At the end of this unit, the student will be able to

- Explain the basic concepts of robot controlling systems. **L2**
- Outline PD and PID control schemes. **L2**
- Use the force control strategies to determine the forces in robot. **L3**
- Explain the force control and torque control techniques. **L2**

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UNIT – V: Robot Vision: **8 Hrs**

Introduction, architecture of robotic vision system, image processing, image acquisition camera, image enhancement, image segmentation, imaging transformation, Camera transformation and calibrations, industrial applications of robot vision.

Learning Outcomes:

At the end of this unit, the student will be able to

- Identify the components of robot vision system. **L3**
- Explain the concept of image enhancement, segmentation and transformation. **L2**
- List the various components of robot vision system. **L1**
- Illustrate the industrial applications of robot vision system. **L2**

Text Books:

1. Mikell P. Groover and Mitchell Weiss, Roger N. Nagel,Nicholas G.Odrey , Industrial Robotics — Mc Graw Hill, 1986.
2. R K Mittal and I J Nagrath, Robotics and control, Illustrated Edition, Tata McGraw Hill India 2003..

Reference Books:

1. Saeed B. Niku, Introduction to Robotics – Analysis, System, Applications, 2nd Edition, John Wiley & Sons, 2010.
2. H. Asada and J.J.E. Slotine, Robot Analysis and Control, 1st Edition Wiley- Interscience, 1986.
3. Robert J. Schillin, Fundamentals of Robotics: Analysis and control, Prentice-Hall Of India Pvt. Limited, 1996.
4. Mohsen shahinpoor, A robot Engineering text book, Harper & Row Publishers,1987.
5. John.J.Craig Addison, Introduction to Robotics: Mechanics and Control, Wesley, 1999.
6. K.S. FU, R.C. Gonzalez and C.S.G Lee, Robotics: Control, sensing, vision, and intelligence . Mc Graw Hill, 1987.
7. Richard D. Klafter, Thomas Robotic Engineering an integrated approach, PHI publications 1988.

Course Outcomes:

At the end of this Course the student will be able to

- Explain fundamentals of Robots. **L2**
- Apply kinematics and differential motions and velocities. **L3**
- Demonstrate control of manipulators. **L2**
- Understand robot vision. **L2**
- Develop robot cell design and programming. **L3**

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B.Tech III Year II Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

19AME65c- SENSORS FOR INTELLIGENT MANUFACTURING

(Open Elective - II)

L	T	P	C
3	0	0	3

Course Objectives: The objectives of the course are to make the students learn about

- Familiarize the sensors used in intelligent manufacturing.
- Illustrate sensors used in precision manufacturing and CNC machine tools.
- Explain sensors for monitoring of manufacturing systems.
- Outline advanced sensors used in intelligent manufacturing.

UNIT – 1: Introduction **12 Hrs**

Principles, classifications and characteristics of sensors – Electrical, magnetic, optical, acoustic, pneumatic, magnetic, electro-optical and vision sensors, role of sensors in intelligent manufacturing.

Learning Outcomes:

At the end of this unit, the student will be able to

- List out various types of sensors used in manufacturing. **L1**
- Explain the characteristics of different sensors. **L3**
- Explain optical, magnetic, pneumatic and acoustic sensors. **L3**
- Describe the role of sensors in intelligent manufacturing. **L4**

UNIT – II: Sensors and control in CIM and FMS: **10 Hrs**

Design of CIM, decision support system for CIM, analysis of CIM, development of CIM strategy with sensors and control. FMS-Robot control with machine vision sensors-Architecture of robotic vision system, image processing, image acquisition, enhancement, segmentation, transformation, industrial application of robot vision, multi Sensor controlled robots, measurement of robot density, robot programming.

Learning Outcomes:

At the end of this unit, the student will be able to

- Identify various types of inbellisort manufacturing systems. **L2**
- List the various types of sensors in CIM. **L2**
- Explain machine sensors. **L3**
- Describe architecture of robotic design systems. **L4**

UNIT – III: Sensors in Precision Manufacturing: **8Hrs**

Testing of manufacturing components, principles and applications of digital Encoders, opto-electronic colour sensors, control applications in robotics. Sensors for CNC machine tools– linear, position and velocity sensors. Automatic identification techniques for shop floor control.

Learning Outcomes:

At the end of this unit, the student will be able to

- List out different types of sensors in precision manufacturing. **L1**
- Describe the principle behind opto-electronic color sensors **L2**
- Select sensors for CNC machine tools. **L3**
- Explain automatic identification techniques for shop floor control. **L3**

UNIT – IV: Control of Manipulators: **8 Hrs**

Sensors for Monitoring of Manufacturing Systems: Principles – sensors for monitoring temperature, force, vibration and noise. Sensors to detect machinery faults. Selection of sensors and monitoring techniques.

Learning Outcomes:

At the end of this unit, the student will be able to

- Identify various types of machine failures in manufacturing systems. **L2**
- Select sensors for monitoring of force, vibration and noise. **L3**
- Explain monitoring techniques for machinery faults. **L3**
- Name sensors used for temperature. **L3**

UNIT – V: Smart / Intelligent sensors: **8 Hrs**

Integrated sensors, micro sensors, nano sensors. Manufacturing of semi conductor sensors. Fibre optic sensors – Fibre optic parameters, configurations, photoelectric sensor for long distance, sensor alignment techniques.

Learning Outcomes:

At the end of this unit, the student will be able to

- List out advance sensors in intelligent manufacturing. **L1**
- Explain about semiconductor and integrated sensors. **L3**
- Describe micro and nano sensors. **L3**
- Discuss principles of fibre optic sensors. **L3**

Text Books:

1. Sabrie Soloman, Sensors and Control systems in Manufacturing, McGraw-Hill, 2/e, 2010.
2. H.K Tonshoff and I.Inasaki, Sensor Applications Vol 1: Sensors in Manufacturing, Wiley-VCH Publications, 2001.

Reference Books:

1. Sabrie soloman, Sensors Handbook, McGraw Hill, 2/e, 20210
2. Mikell P.Groover, Mitchell Weiss, Roger N.Nagel, Nicholas G.Odrey, Industrial Robotics, Tata McGraw-Hill, 2008.

Course Outcomes:

At the end of this Course the student will be able to

- Classify various sensors used in intelligent manufacturing. **L2**
- Describe sensors used in computer integrated manufacturing and machine sensors. **L3**
- Discuss sensors used in precision manufacturing. **L3**
- Identify reasons behind machinery faults. **L3**
- Discuss advanced sensors in intelligent manufacturing. **L3**

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B.Tech III Year II Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

19AME65d- NON-CONVENTIONAL SOURCES OF ENERGY

(Open Elective-II)

L	T	P	C
3	0	0	3

Course Objectives: The objectives of the course are to make the students learn about

- Familiarize with concept of various forms of renewable energy.
- Understand division aspects and utilization of renewable energy sources for both domestics and industrial applications.
- Expose the students in an environmental and cost economics of using renewable energy sources compared to fossil fuels.

UNIT – 1: Principles Of Solar Radiation: **10 Hrs**

Role and potential of new and renewable source, the solar energy option, Environmental impact of solar power, physics of the sun, the solar constant, extraterrestrial and terrestrial solar radiation, solar radiation on titled surface, instruments for measuring solar radiation and sun shine, solar radiation data.

Learning Outcomes:

At the end of this unit, the student will be able to

- explain the basic concepts of solar radiation and solar collectors **L2**
- develop sun path diagrams **L3**
- Explain environmental impact of solar power. **L2**
- Discuss the instruments for measuring solar radiation and sun shine. **L6**

UNIT – II: Solar Energy Collection: **10 Hrs**

Solar Energy Collection: Flat plate and concentrating collectors, classification of concentrating collectors, orientation and thermal analysis, advanced collectors.

Solar Energy Storage and Applications :

Different methods, Sensible, latent heat and stratified storage, solar ponds. Solar Applications solar heating technique, solar distillation and drying, photovoltaic energy conversion.

Learning Outcomes:

At the end of this unit, the student will be able to

- Classify solar energy collectors. **L1**
- Describe orientation and thermal analysis of solar energy collectors. **L2**
- Explain photovoltaic energy conversion. **L2**
- Illustrate the various solar energy applications. **L2**

UNIT – III: Wind Energy & Bio-Mass **10Hrs**

Wind Energy : Sources and potentials, horizontal and vertical axis windmills, performance characteristics, Betz criteria

BIO-MASS: Principles of Bio-Conversion, Anaerobic/aerobic digestion, types of Bio-gas digesters, gas yield, combustion characteristics of bio-gas, utilization for cooking, I.C.Engine operation and economic aspects.

Learning Outcomes:

At the end of this unit, the student will be able to

- Compare vertical axis and horizontal axis windmills. **L3**
- Illustrate the performance characteristics of vertical axis and horizontal axis windmills. **L2**
- Discuss the principles of Bio-conversion. **L6**
- Explain combustion characterizes of bio-gas. **L2**

UNIT – IV: Geothermal Energy & Ocean Energy **8 Hrs**

Geothermal Energy: Resources, types of wells, methods of harnessing the energy, potential in India.

Ocean Energy: OTEC, Principles utilization, setting of OTEC plants, thermodynamic cycles. Tidal and wave energy: Potential and conversion techniques, mini-hydel power plants, and their economics.

Learning Outcomes:
At the end of this unit, the student will be able to

- Explain the concept of geothermal and ocean energy. **L2**
- Discuss OTEC and principles utilization. **L6**
- Explain mini-hydel power plants and their economics. **L2**

UNIT – V: Direct Energy Conversion **10 Hrs**

Need for DEC, Carnot cycle, limitations, principles of DEC. Thermo-electric generators, Seebeck, Peltier and Joule Thomson effects, Figure of merit, materials, applications, MHD generators, principles, dissociation and ionization, hall effect, magnetic flux, MHD accelerator, MHD Engine, power generation systems, electron gas dynamic conversion, economic aspects. Fuel cells, principles, faraday's law's, thermodynamic aspects, selection of fuels and operating conditions.

Learning Outcomes:
At the end of this unit, the student will be able to

- Describe the working principle of MHD engine. **L2**
- Explain constructional details of various thermo-electric generators. **L2**
- Identify the various economic, thermodynamic aspects of electron gas dynamic conversion system. **L3**

Text Books:

1. Renewable energy resources, Tiwari and Ghosal, Narosa.
2. Non-Conventional Energy Sources, G.D. Rai.

Reference Books:

1. Renewable Energy Sources, Twidell& Weir.
2. Solar Energy, Sukhatme
3. Solar Power Engineering, B.S.Magal Frank Kreith & J.F.Kreith.
4. Non-Conventional Energy, Ashok V Desai, Wiley Eastern
5. Principles of Solar Energy, Frank Krieth & John F Kreider.
6. Non-Conventional Energy Systems, K Mittal , Wheeler.

Course Outcomes:
At the end of this Course the student will be able to

- Outline the various economic, thermodynamic aspects of electron gas dynamic conversion system. **L3**
- Explain the basic concepts of solar radiation and solar collectors. **L2**
- Discus OTEC and principles utilization. **L6**
- Describe orientation and thermal analysis of solar energy collectors. **L2**

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B.Tech III Year I Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

19AME65e- NEMS & MEMS

(Open Elective-II)

L	T	P	C
3	0	0	3

Course Objectives: The objectives of the course are to make the students learn about

- Familiarize the basics of MEMS and NEMS
- Focus on the available tools and procedures to analyze and design micro/nano-scale engineering systems
- Demonstrate main issues stemming from operating in micro and nano length scale.
- Train MEMS and NEMS devices and their applications
- Impart fabrication and modeling aspects of MEMS and NEMS devices
- Enable a systematic design approach to engineering projects

UNIT – I: INTRODUCTION: **10 Hrs**

New trends in Engineering and Science: Micro and Nano scale systems, Overview of Nano and Micro Electromechanical Systems, Micro electromechanical systems devices and structures, Nanotechnology and (N+1) Problem, Physical and Technological limitation of miniaturization;Nanoscale Structures / Nanoparticles: Adhesion, Nanotubes, Nanowires, Quantum Dots, Multilayered structures, Nanocluster Composites Crystals: Lattices, Nanocrystals and nanoparticles.

Learning Outcomes:

At the end of this unit, the student will be able to

- Explain the concepts, nanostructures and nanotechnology. **L2**
- Identify the principles of processing, manufacturing and characterization of nanomaterials and nanoscale systems. **L3**
- Apply electronic microscopy, and nano indentation techniques to characterize nano materials and nanostructures. **L3**

UNIT – II: MODELING OF MEMS AND NEMS: **10 Hrs**

Introduction to modeling, analysis and simulation, Scaling laws for length and time and its effect on modeling, Grain size effect on materials properties (mechanical, electrical, magnetic, etc.), basic electro-magnetic with application to MEMS and NEMS, Modeling developments of micro-and nano actuators using electromagnetic fields, Lumped-parameter mathematical models of MEMS, Energy conversion in NEMS and MEMS.

Learning Outcomes:

At the end of this unit, the student will be able to

- Explain the operation of micro devices, micro systems and their applications. **L1**
- Model MEMS devices and structures. **L3**
- Develop micro devices, micro systems using the MEMS fabrication process. **L3**

UNIT – III: MANUFACTURING TECHNIQUES AND PROCESSES: **10Hrs**

Cleanroom and Fab Procedures, Vacuum: Vacuum Systems, Pumps and Gauges; Materials for MEMS: Silicon, silicon compounds, polymers, metals; Microfabrication Technologies: Beam Machining – Ion-Beam, E-Beam and LASER processing techniques; Lithographic Patterning – Bulk μMachining, Surface μMachining, SU-8 Lithography & Surface forming, LIGA Process: X-Ray Lithography &UV LIGA; Precision Machining – Precision Milling and turning, μEDM, Micromolding & Embossing, Precision Bonding, Thin Films: Processes, Evaporation, Dry and Wet Etching, Sputtering Deposition; Characterization: Optical Techniques/Microscope, SEM, Optical and Electrical, Properties, Auger and Thin Film Analysis, AFM.

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Learning Outcomes:

At the end of this unit, the student will be able to

- Outline computer-aided design, fabrication, analysis and characterization of nano-structured materials, micro- and nano-scale devices. L2
- Develop micro/nanosystems for photonics and optical applications. L2
- Explain manufacturing processes based on diffusion, deposition and patterning of surfaces. L4

UNIT – IV: MICRO SENSORS AND MICRO ACTUATORS: 8 Hrs

MEMS Sensors: Piezoresistive pressure sensor, Acoustic wave sensors, Resonant Microsensor, Peizoelectric Rate gyroscope, Capacitive Accelerometer; etc. Nanosensors & Nano biosensors; Design of Actuators: Actuation using thermal forces, Actuation using shape memory Alloys, Actuation using piezoelectric crystals, Actuation using Electrostatic forces (Parallel plate, Torsion bar, Comb drive actuators), Micromechanical Motors and pumps; Nanomotor, Molecular Motor, etc.

Learning Outcomes:

At the end of this unit, the student will be able to

- Outline basic approaches for various actuator design. L2
- Distinguish between various MEMS sensors. L4
- Explain the operation principles of advanced micro- and nanosystems. L4

UNIT – V: CONTROL OF MICROELECTROMECHANICAL SYSTEMS 10 Hrs

Introduction to Microelectromechanical Systems Control, Control of Microelectromechanical Systems, Intelligent Control of MEMS; Synthesis, Analysis, Fabrication, and Computer-Aided Design of MEMS, Case studies: Design and Fabrication Analysis of Translational Microtransducers, Single-Phase and three phase Reluctance Micromotors, Modeling, Analysis, and Control of Micromirror Actuators; Application of Nanomotor in Bio-medical applications, Nano robots, Electronics based on CNT - Molecular Electronics.

Learning Outcomes:

At the end of this unit, the student will be able to

- Identify micro electro mechanical system control for a given application. L3
- Synthesis intelligent control of MEMS/NEMS. L4
- Evaluate MEMS/NEMS for various applications. L4

Text Books:

1. Marc Madou, Fundamentals of Micro fabrication, CRC press 1997.
2. Stephen D. Senturia, Micro system Design, Kluwer Academic Publishers,2001
3. J. A. Pelesko and D. H. Bernstein, Modeling of MEMS and NEMS, Chapman & Hall/CRC, 2003.
4. Sergey Edward Lyshevski, Lyshevski Edward Lyshevski, MEMS and NEMS: Systems, Devices and Structures, CRC Press, 2005.

Reference Books:

1. Tai Ran Hsu, MEMS and Microsystems Design and Manufacture, Tata Mcraw Hill, 2002.
2. Chang Liu, Foundations of MEMS, Pearson education India limited, 2006
3. Mahalik N P, MEMS, Tata McGraw-Hill Education, 2008.
4. Gianfranco Cerofolini, Nanoscience and Technology: Nanoscale Devices, Springer, 2009.

Course Outcomes:

At the end of this Course the student will be able to

- Identify processing and characterization of nanomaterials. L3
- Plan operation of micro devices, micro systems and their applications. L3
- Describe the implementation of MEMS into products. L4
- Explain the operation principles of advanced micro- and nanosystems. L4
- Apprise the technology implemented in advanced micro- and nanosystem. L5
- Design the micro devices, micro systems using the MEMS fabrication process. L5

B.Tech III Year II Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

19AME65f – OPTIMIZATION TECHNIQUES THROUGH MATLAB

(Open Elective - II)

L	T	P	C
3	0	0	3

Course Objectives: The objectives of the course are to make the students learn about

- Introduce basics of MATLAB
- Familiarize the fundamentals of optimization
- Explain single variable optimization using various methods
- Implement multi variable optimization using various methods
- Train various evolutionary algorithms.

UNIT – 1: Introduction to MAT LAB: **10 Hrs**

Overview, MATLAB Preliminaries, Basics of MATLAB, Beyond the Basics of MATLAB, Popular Functions and Commands, Plotting using MATLAB, Optimization with MATLAB.

Learning Outcomes:

At the end of this unit, the student will be able to

- Write simple codes in MATLAB. **L3**
- Plot the data using MATLAB. **L3**
- Implement optimization models in MATLAB. **L3**

UNIT – II: Introduction to Optimization: **10 Hrs**

Statement of an optimization problem, Classifications of optimization Problems: Single variable optimization, Multi variable optimization with no constraints, Multi variable optimization with equality constraints, Multi variable optimization with inequality constraints, Convex and Concave programming.

Learning Outcomes:

At the end of this unit, the student will be able to

- Build optimization problem. **L1**
- Solve various optimization problems **L3**
- Compare convex and concave programming **L4**

UNIT – III: Single Variable Optimization: **10Hrs**

Finite difference method, Central difference method, Runge-Kutta method, interval halving method, golden section method with MATLAB code.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand various methods involving single variable optimization. **L2**
- Develop codes in MATLAB for different methods. **L3**
- Identify methods for solving a single variable optimization problem. **L3**

UNIT – IV: Multi Variable Optimization: **8 Hrs**

Conjugate gradient method, Newton's method, Powell's method, Flectcher- Reeves method, Hooke and Jeeves method, interior penalty function with MATLAB code.

Learning Outcomes:

At the end of this unit, the student will be able to

- Apply various methods involving multi variable optimization. **L2**
- Develop codes in MATLAB for solving various multi variable optimization problems. **L3**
- Choose methods for solving a multi variable optimization problem. **L3**

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UNIT – V: Evolutionary Algorithms: **8 Hrs**

Overview, Genetic Algorithms: Basics of Genetic Algorithms, Options in MATLAB, Multi Objective Optimization using Genetic Algorithms, Ant Colony Optimization, Simulated Annealing, Particle Swarm Optimization.

Learning Outcomes:

At the end of this unit, the student will be able to

- Apply different types of genetic algorithms. **L3**
- Model optimization problems using genetic algorithms in MATLAB. **L3**
- Compare different genetic algorithms for performance. **L5**

Text Books:

1. Rao V.Dukkipati, MATLAB: An Introduction with Applications, Anshan, 2010.
2. Achille Messac, Optimization in practice with MATLAB, Cambridge University Press, 2015.
3. Jasbir S Arora, Introduction to optimum design, 2/e. Elsevier, 2004.

Reference Books:

1. Cesar Perez Lopez, MATLAB Optimization Techniques, Academic press, Springer publications, 2014.
2. Steven C.Chapra, Applied Numerical Methods with MATLAB for Engineers and scientists, 4/e, McGraw-Hill Education, 2018.

Course Outcomes:

At the end of this Course the student will be able to

- Use optimization terminology and concepts, and understand how to classify an optimization problem. **L4**
- Apply optimization methods to engineering problems. **L3**
- Implement optimization algorithms. **L3**
- Compare different genetic algorithms. **L5**
- Solve multivariable optimization problems. **L4**

B.Tech III-Year II Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

19ACS65a- INTRODUCTION TO MACHINE LEARNING

Open Elective-II

L	T	P	C
3	0	0	3

Course Objectives:

- To be able to formulate machine learning problems corresponding to different applications.
- To understand a range of machine learning algorithms along with their strengths and weaknesses.
- To understand the basic theory underlying machine learning.

UNIT – I: INTRODUCTION **8hrs**

Introduction: An illustrative learning task, and a few approaches to it. What is known from algorithms? Theory, Experiment. Biology. Psychology. Overview of Machine learning, related areas and applications. Linear Regression, Multiple Regression, Logistic Regression, logistic functions.

Learning Outcomes:

At the end of this unit, the student will be able to

- Argue the importance and role of software architecture in large-scale software systems. **L2**
- Design and motivate software architecture for large-scale software systems. **L3**

UNIT – II: DECISION TREE LEARNING **8hrs**

Decision Tree Learning: - Minimum Description Length Principle. Occam's razor. Learning with active queries Introduction to information theory, Decision Trees, Cross Validation and Over fitting. Neural Network Learning: Perceptions and gradient descent back propagation, multilayer networks and back propagation.

Learning Outcomes:

At the end of this unit, the student will be able to

- Design and motivate software architecture for large-scale software systems **L3**
- Recognize major software architectural styles and frameworks. **L4**

UNIT – III: SAMPLE COMPLEXITY AND OVER FITTING **8hrs**

Sample Complexity and Over fitting: Errors in estimating means. Cross Validation and jackknifing VC dimension. Irrelevant features: Multiplicative rules for weight tuning. Support Vector Machines: functional and geometric margins.

Learning Outcomes:

At the end of this unit, the student will be able to

- Recognize major software architectural styles and frameworks. **L3**
- Describe a software architecture using various documentation approaches and architectural description languages. **L4**

UNIT – IV: INSTANCE-BASED TECHNIQUES **7 Hrs**

Instance-based Techniques: Lazy vs. eager generalization. K nearest neighbor, case- based reasoning. Clustering and Unsupervised Learning: K-means clustering, Gaussian mixture density estimation, model selection

Learning Outcomes:

At the end of this unit, the student will be able to

- Describe a software architecture using various documentation approaches and architectural description languages. **L5**

- Generate architectural alternatives for a problem and selection among them. **L3**

UNIT – V: Genetic Algorithms

Genetic Algorithms: Different search methods for induction - Explanation-based Learning: using prior knowledge to reduce sample complexity. Dimensionality reduction: feature selection, principal component analysis.

Learning Outcomes:

At the end of this unit, the student will be able to

- Use well-understood paradigms for designing new systems. **L3**
- Identify and assess the quality attributes of a system at the architectural level. **L4**

Text Books:

1. Tom Michel, Machine Learning, McGraw Hill, 1997
2. Trevor Has tie, Robert Tibshirani & Jerome Friedman. The Elements of Statically Learning, Springer Verlag, 2001.

Reference Books:

1. Machine Learning Methods in the Environmental Sciences, Neural Networks, William W Hsieh, Cambridge Univ Press.
2. Richard o. Duda, Peter E. Hart and David G. Stork, pattern classification, John Wiley & Sons Inc.,2001 3. Chris Bishop, Neural Networks for Pattern Recognition, Oxford University Press, 1995.

Course Outcomes:

At the end of this Course the student will be able to

- Student should be able to understand the basic concepts such as decision trees and neural networks.Ability to formulate machine learning techniques to respective problems **L2**
- Apply machine learning algorithms to solve problems of moderate complexity. **L3**

B.Tech III.Year II Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

19ACS65b- INTRODUCTION TO COMPUTER NETWORKS

Open Elective-II

L	T	P	C
3	0	0	3

Course Objectives:

This course is designed to:

- Introduce the basic concepts of Computer Networks.
- Familiarize with the layered approach and different layers of computer networks.
- Familiarize with the design issues of different layers.
- Explain the working of different protocols of a computer network..

UNIT – I: INTRODUCTION **8hrs**

Introduction: Uses of computer networks, network hardware, Protocol Hierarchies, Design Issues for the layers, Connection oriented vs Connectionless Service. **The physical layer:** The theoretical basis for data communication, Guided transmission media, wireless transmission, communication satellites.

Learning Outcomes:

At the end of this unit, the student will be able to

- Argue the importance and role of software architecture in large-scale software systems **L2**
- Design and motivate software architecture for large-scale software systems. **L3**

UNIT – II: THE DATA LINK LAYER **8hrs**

The data link layer: Data link layer design issues, error detection and correction, elementary data link protocols, sliding window protocols

The medium access control: The channel allocation problem, multiple access protocols, Ethernet.

Learning Outcomes:

At the end of this unit, the student will be able to

- Design and motivate software architecture for large-scale software systems. **L3**
- Recognize major software architectural styles and frameworks. **L4**

UNIT – III: THE NETWORK LAYER **8hrs**

The network layer: Network layer design issues, Flooding, Distance Vector Routing, Link state Routing.

Learning Outcomes:

At the end of this unit, the student will be able to

- Recognize major software architectural styles and frameworks. **L3**
- Describe a software architecture using various documentation approaches and architectural description languages. **L4**

UNIT – IV: IP VERSION 4 PROTOCOL **7 Hrs**

The IP version 4 Protocol, IP Addresses, IP version 6, Internet control protocols, OSPF, BGP, Internet multicasting.

The transport layer: Elements of transport protocols, congestion control, The internet transport protocols: UDP and TCP.

Learning Outcomes:

At the end of this unit, the student will be able to

- Describe a software architecture using various documentation approaches and architectural description languages. **L5**

- Generate architectural alternatives for a problem and selection among them. **L3**

UNIT – V: THE APPLICATION LAYER

The application layer: DNS- The Domain Name System, Electronic Mail, WWW Architectural Overview, Static Web pages, Dynamic web pages and web applications.

Learning Outcomes:

At the end of this unit, the student will be able to

- Use well-understood paradigms for designing new systems **L3**
- Identify and assess the quality attributes of a system at the architectural level. **L4**

Text Books:

1. Andrew S.Tanenbaum, David j.wetherall, Computer Networks, 5th Edition, PEARSON.

Reference Books:

1. Forouzan, Datacommunications and Networking, 5th Edition, McGraw Hill Publication.

Course Outcomes:

Students will be able to:

- Recognize the method of using layered approach for design of computer networks. **L2**
- Explain the functionality of each layer of a computer network. **L3**
- Apply the knowledge of layered approach for the design of computer network software **L4**
- Analyze the performance of protocols of a computer network. **L4**
- Recommend the protocols for different applications. **L5**
- Propose new protocols for a computer networks. **L6**

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

19ACS65c- WEB DESIGN AND MANAGEMENT

Open Elective-II

L	T	P	C
3	0	0	3

Course Objectives:

- To Learn the basic concepts in HTML, CSS, JavaScript
- To Understand the responsive design and development
- To learn the web project management and maintenance process
- To Design a Website with HTML, JS, CSS / CMS - Word press

UNIT – I: WEB DESIGN - HTML MARKUP FOR STRUCTURE **8hrs**

Working of Web - HTML Markup for Structure - Creating simple page - Marking up text - Adding Links - Adding Images - Table Markup - Forms - HTML5.

Learning Outcomes:

At the end of this unit, the student will be able to

- Argue the importance and role of software architecture in large-scale software systems. **L2**
- Design and motivate software architecture for large-scale software systems. **L3**

UNIT – II: CSS AND JAVASCRIPT **8hrs**

CSS - Formatting text - Colours and Background - Padding, Borders and Margins – Floating and positioning - Page Layout with CSS - Transition, Transforms and Animation – JavaScript - Using Java Script.

Learning Outcomes:

At the end of this unit, the student will be able to

- Design and motivate software architecture for large-scale software systems. **L3**
- Recognize major software architectural styles and frameworks. **L4**

UNIT – III: RESPONSIVE WEB DESIGN **8hrs**

Sass for Responsive Web Design - Marking Content with HTML5 - Mobile-First or DesktopFirst - CSS Grids; CSS Frameworks, UI Kits, and Flexbox for RWD - Designing small UIs by Large Finger - Images and Videos in Responsive Web Design - Meaningful Typography for Responsive Web Design.

Learning Outcomes:

At the end of this unit, the student will be able to

- Recognize major software architectural styles and frameworks. **L3**
- Describe a software architecture using various documentation approaches and architectural description languages. **L4**

UNIT – IV: WEB PROJECT MANAGEMENT **7 Hrs**

Project Life Cycle - Project Definition - Discovery and Requirements - Project Schedule and Budgeting - Running the project - Technical Documentation - Development, Communicaton, Documentation - QA and testing -Deployment - Support and operations.

Learning Outcomes:

At the end of this unit, the student will be able to

- Describe a software architecture using various documentation approaches and architectural description languages. **L5**
- Generate architectural alternatives for a problem and selection among them. **L3**

UNIT – V: PROJECT CASE STUDY

Using HTML, CSS, JS or using Opensource CMS like Word press, design and develop a Website having Aesthetics, Advanced and Minimal UI Transitions based on the project - Host and manage the project live in any public hosting.

Learning Outcomes:

At the end of this unit, the student will be able to

- Use well-understood paradigms for designing new systems. **L3**
- Identify and assess the quality attributes of a system at the architectural level. **L4**

Text Books:

1. Jennifer Niederst Robbins, "Learning Web Design", O'REILLY 4th Edition
2. Ricardo Zea, "Mastering Responsive Web Design", PACKT Publishing, 2015
3. Justin Emond, Chris Steins, "Pro Web Project Management", Apress,2011

Reference Books:

1. Jon Duckett, "HTML and CSS: Design and Build Websites", John Wiley and Sons, edition 2014
2. Jon Duckett, Jack Moore, "JavaScript & JQuery: Interactive Front-End Web Development", John Wiley and Sons, edition 2014
3. Uttam K. Roy "Web Technologies" Oxford University Press, 13th impression, 2017 4. Word press - http://www.wpbeginner.com/category/wp-tutorials/

Course Outcomes:

At the end of this Course the student will be able to

- Recognize the method of using layered approach for design . **L2**
- Explain the functionality of each layer of a computer network. **L3**
- Apply the knowledge of layered approach for the design of computer network software **L4**
- Analyze the performance of protocols of a computer network. **L4**
- Recommend the protocols for different applications. **L5**
- Propose new protocols for a computer networks. **L6**

OPL. V

B.Tech III Year II Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

19AHS14a-MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS

(Humanities Elective-I)(Common to EEE, ECE & CSE)

L	T	P	C
3	0	0	3

Course Objectives:

- To inculcate the basic knowledge of micro economics and financial accounting.
- To make the students learn how demand is estimated for different products, input- output relationship for optimizing production and cost.

UNIT – 1

Introduction to Managerial Economics:

Definition of Managerial Economics, Nature and Scope – Managerial Economics and its relation with other subjects- Basic economic tools in Managerial Economics.

Demand Analysis & Elasticity of Demand: Meaning- Demand distinctions- Demand determinants- Law of Demand and its exceptions, Types of Elasticity of demand - Measurement of price elasticity of demand, Significance of Elasticity of Demand.

Demand Forecasting: Meaning - Factors governing demand forecasting - Methods of demand forecasting - Forecasting demand for new products.

Learning Outcomes:

At the end of this unit, the student will be able to

- Know the nature and scope of Managerial Economics and its importance. **L1**
- Understand the concept of demand and its determinants. **L2**

UNIT – II

Theory of Production: Production Function- Isoquants and Isocosts, MRTS, Cobb-Douglas Production function.

Cost Analysis: Cost concepts, Opportunity cost, Fixed Vs Variable costs, Explicit costs Vs. Implicit costs, Out of pocket costs vs. Imputed costs. Break even analysis -Determination of Break-Even Point (simple problems) - Managerial Significance and limitations of BEP.

Learning Outcomes:

At the end of this unit, the student will be able to

- Know the production function, Input-Output relationship and different cost concepts. **L1**
- Apply the least-cost combination of inputs. **L2**

UNIT – III

Introduction to Markets: Market structures: Types of competition, Features of Perfect Competition, Monopoly and Monopolistic Competition. Price-Output Determination under Perfect Competition, Monopoly, Monopolistic Competition.

Pricing Policies: Methods of Pricing-Marginal Cost Pricing, Limit Pricing, Market Skimming Pricing, Penetration Pricing, Bundling Pricing, and Peak Load Pricing. Internet Pricing Models: Flat rate pricing, Usage sensitive pricing, Transaction based pricing, Priority pricing, charging on the basis of social cost, Precedence model, Smart market mechanism model.

Learning Outcomes:

At the end of this unit, the student will be able to

- Apply the price output relationship in different markets. **L1**
- Evaluate price-output relationship to optimize cost, revenue and profit. **L2**

1/10/21

UNIT – IV

Types of Industrial Organization: Characteristic features of Industrial organization, Features and evaluation of Sole Proprietorship, Partnership, Joint Stock Company, State/Public Enterprises and their types.

Capital Budgeting: Introduction to capital, Meaning of capital budgeting, Need for capital budgeting – Capital budgeting decisions (Examples of capital budgeting) - Methods of Capital Budgeting: Payback Method, Accounting Rate of Return (ARR), IRR and Net Present Value Method (simple problems).

Learning Outcomes:

At the end of this unit, the student will be able to

- Know the concept of capital budgeting and its importance in business. **L1**
- Contrast and compare different investment appraisal methods. **L2**

UNIT – V

Introduction to Financial Accounting: Introduction to Double-entry system, Journal, Ledger, Trial Balance- Final Accounts (with simple adjustments) - Limitations of Financial Statements.

Interpretation and analysis of Financial Statement: Ratio Analysis – Liquidity ratios, Profitability ratios and solvency ratios – Preparation of changes in working capital statement and fund flow statement.

Learning Outcomes:

At the end of this unit, the student will be able to

- Know the concept, convention and significance of accounting. **L1**
- Apply the fundamental knowledge of accounting while posting the journal entries. **L2**

Text Books:

1. **J.V. Prabhakar Rao**: Managerial Economics and Financial Analysis, Maruthi Publications, 2011.
2. **Prof. C.Viswanatha Reddy:** 'Financial Accounting-1' Himalaya Publishing House, Newdelhi.

Reference Books:

1. **A R Aryasri -** Managerial Economics and Financial Analysis, TMH 2011.
2. **Suma damodaran-** Managerial Economics, **Oxford** 2011.
3. **S.A. Siddiqui & A.S. Siddiqui**, Managerial Economics and Financial Analysis, New Age International Publishers, 2011.
4. **N. Appa Rao. & P. Vijaya Kumar**: 'Managerial Economics and Financial Analysis', Cengage Publications, New Delhi, 2011.

Course Outcomes:

At the end of this Course the student will be able to

- Be able to perform and evaluate present worth, future worth and annual worth analyses on one of more economic alternatives. **L1**
- Be able to perform and evaluate payback period and capitalized cost on one or more economic alternatives. **L2**
- Be able to carry out and evaluate benefit/cost, life cycle and breakeven analyses on one or more economic alternatives. **L3**
- Evaluate the capital budgeting techniques. **L4**
- Students can analyze how to invest their capital and maximize returns. **L5**

B.Tech III Year II Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

19AHS14b-ENTERPRENUARSHIP AND INNOVATION MANAGEMENT

(Humanities Elective-I)(Common to EEE, ECE & CSE)

L	T	P	C
3	0	0	3

Course Objectives:
- To enable students understand the opportunities available to start a business.
- To impart knowledge about various sources of support (Financial and Non-financial) available to start an enterprise.

UNIT – 1: FUNDAMENTALS OF ENTREPRENEURSHIP

Fundamentals of Entrepreneurship – Evolution and Theories of Entrepreneurship – Characteristics of Entrepreneurs –Myths of Entrepreneurship – Kakinada Experiment -Elements of leadership –Role of Entrepreneurs in Indian economy – Social and Ethical Perspectives of Entrepreneurship - Corporate entrepreneurship – Social Entrepreneur, women Entrepreneurship
- Opportunities & challenges.

Learning Outcomes:

At the end of this unit, the student will be able to
- Define entrepreneurship and the characteristics of an entrepreneur. **L1**
- Explain the significance of entrepreneurship in the economic development of a nation. **L2**

UNIT – II: IDEATION AND EVALUATION OF BUSINESS IDEAS

Opportunity identification – Ideations process - Sources of business ideas – Role of creativity – Sources of Innovation - Business Idea Evaluation - Product/ Service design – Design Thinking - Customer Value Proposition (CVP) – Business models.

Case study: Business cases of OYO, Paytm and Flipkart/ Smartmart.

Activity: Idea generation in groups and CVP.

Learning Outcomes:

At the end of this unit, the student will be able to
- Select the right business ideas. **L1**
- Explain the business idea evaluation process **L2**

UNIT – III: Business Organizations and Venture Establishment

Forms of business organisations/ownership – Techno-economic feasibility assessment – Financial feasibility – Market feasibility – Preparation of Business plan – Business canvas & Lean canvas – Challenges & Pitfalls in selecting new venture.

Activity: Preparation of business plan (draft).

Learning Outcomes:

At the end of this unit, the student will be able to
- Recall different forms of business organizations. **L1**
- Develop business canvas. **L2**

UNIT – IV: Introduction to Innovation

Creativity, Invention and innovation, Types of Innovation, Relevance of Technology for Innovation, The Indian innovations and opportunities.

Learning Outcomes:

At the end of this unit, the student will be able to
- Able to develop new ideas to discover new ways of looking problems and opportunities. **L1**
- Apply technology to innovation. **L2**

1/10/21

UNIT – V: Promoting and managing innovation

Innovators and Imitators, Patents, Trademarks, Intellectual Property, Exploring, Executing, Leveraging and renewing innovation, Enhancing Innovation Potential & Formulating strategies for Innovation.

Learning Outcomes:

At the end of this unit, the student will be able to

- Intellectual Property Licensing. **L1**
- Summarize the importance of IPR. **L2**

Text Books:

1. Robin Lowe and Sue Marriott, Enterprise: Entrepreneurship and Innovation Concepts, Contexts and Commercialization.
2. John Bessant and Joe Tidd, Innovation and Entrepreneurship.

Reference Books:

1. Rabindra N. Kanungo "Entrepreneurship and innovation", Sage Publications, New Delhi, 1998.
2. Peter F. Drucker, Innovation and Entrepreneurship.
3. EDII "Faculty and External Experts – A Hand Book for New Entrepreneurs Publishers: Entrepreneurship Development" Institute of India, Ahmadabad, 1986.
4. Philips, Bonefiel and Sharma (2011), Social Entrepreneurship, Global vision publishing house, New Delhi.

Course Outcomes:

At the end of this Course the student will be able to

- Choose entrepreneurship as an alternative career. **L1**
- Distinguish between corporate and social entrepreneurs. **L2**
- Examine and build customer value proposition. **L3**
- Analyze feasibility of business ideas. **L4**
- Compare various supports schemes provided by GOI. **L5**

B.Tech III Year II Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

19AEC66- MICROPROCESSORS & MICROCONTROLLERS LAB

L	T	P	C
0	0	3	1.5

Course Objectives: The objectives of the course are to make the students learn about

- To become skilled in 8086 assembly language programming.
- To understand programmable peripheral devices and their interfacing.
- To learn interfacing and writing assembly language programming with 8051 microcontroller.

Minimum Ten Experiments to be conducted (Five from each section)

I) 8086 Microprocessor Programs using MASM/8086 kit.

1. Introduction to MASM Programming.
2. Arithmetic operation – Multi byte Addition and Subtraction, Multiplication and Division – Signed and unsigned Arithmetic operation, ASCII – arithmetic operation.
3. Logic operations – Shift and rotate – Converting packed BCD to unpacked BCD, BCD to ASCII conversion.
4. By using string operation and Instruction prefix: Move Block, Reverse string, Sorting, Length of the string, String comparison.

Interfacing:

5. 8259 – Interrupt Controller and its interfacing programs
6. A /D Interfacing
7. D /A Interfacing
8. Stepper Motor.

II) Microcontroller 8051 Trainer kit

1. Arithmetic operation – Multi byte Addition and Subtraction, Multiplication and Division – Signed and unsigned Arithmetic operation.
2. Logic operations – Shift and rotate.
3. Sorting- Ascending and descending order.

Interfacing using 8051 Trainer kit:

4. A/D Interfacing
5. D /A Interfacing
6. Switch Interfacing
7. Relay Interfacing

Course Outcomes:

At the end of this Course the student will be able to

- Write programs in assembly language and work with 8086 microprocessor. **L6**
- Interface programmable peripheral devices with 8086 microprocessor. **L3**
- Learn interfacing and write assembly language programming with 8051 microcontroller. **L1**

B.Tech III Year II Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

19AEC67- DIGITAL SIGNAL PROCESSING LAB

L	T	P	C
0	0	2	1

Course Objectives: The objectives of the course are to make the students learn about

- To simulate basic signal processing operations like convolution and correlation.
- To simulate DSP operations like DFT and FFT.
- To design and implement IIR and FIR filters using simulation software and verify their frequency responses.

List of Experiments:

1. Generating, plotting and finding the power and energy a given signal.
2. Convolution and correlation (auto and cross) of discrete sequences without using built in functions.
3. DTFT of a given signal
4. N-Point Decimation in timeFFT algorithm.
5. N-Point Decimation in frequency FFT algorithm.
6. Find the frequency response of analog Butterworth prototype filters (LP/HP/BP/BR).
7. Find the frequency response of analog chebyshev prototype filters (LP/HP/BP/BR).
8. Implement IIR Butterworth filter (LP/HP/BP/BR) using bilinear transformation techniques.
9. ImplementIIRChebyshevfilter (LP/HP/BP/BR) using impulse-invariance transformation techniques.
10. Design of FIR filter using window technique and verifying thefrequency response of the filter
11. Design of IIR filter using any of the available methods and verifyingthe frequency response of the filter
12. Design of FIR filters using frequency sampling method.
13. Generating, plotting and finding the power and energy a given signal.

Course Outcomes:

At the end of this Course the student will be able to

- Simulate and analyze basic signal processing operations like convolution and correlation.(L4) **L4**
- Simulate and analyze DSP operations like DFT and FFT.(L4) **L4**
- Design and implement IIR and FIR filters and verify their frequency responses.(L6) **L6**

B.Tech III Year II Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

19AEC69- MICROWAVE ENGINEERING LAB

L	T	P	C
0	0	2	1

Course Objectives: The objectives of the course are to make the students learn about

- To understand the working, different microwave components and sources in a microwave bench.
- To verify the characteristics of various microwave components using microwave bench set up.
- To draw the radiation pattern of microwave antennas.

Minimum Ten Experiments to be conducted

1. Reflex Klystron Characteristics.
2. Gunn Diode Characteristics.
3. Attenuation Measurement.
4. Directional Coupler Characteristics.
5. VSWR Measurement.
6. Impedance and Frequency Measurement.
7. Waveguide parameters measurement.
8. Scattering parameters of Directional Coupler.
9. Scattering parameters of Magic Tee.
10. Scattering parameters of Circulator.
11. Radiation Pattern Measurement of Horn Antenna.
12. Radiation Pattern Measurement of Patch Antenna.

Course Outcomes:

At the end of this Course the student will be able to

- Understand the working, different microwave components and sources in a microwave bench. **L2**
- Verify the characteristics of various microwave components using microwave bench set up. **L3**
- Draw the radiation pattern of microwave antennas. **L3**

B.Tech III Year II Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

19AHS16-ORGANIZATIONAL BEHAVIOR

(Common to EEE, ECE & CSE)

L	T	P	C
3	0	0	0

Course Objectives:

- To make the student understand about the organizational behavior
- To enable them to develop self motivation, leadership and management.

UNIT – 1:

Organizational Behavior - Introduction to OB - Meaning and definition, scope - Organizing Process – Making organizing effective - Understanding Individual, Behavior – Attitude - Perception - Learning - Personality Types.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand the concept of Organizational Behavior. **L1**
- Evaluate personality types. **L2**

UNIT – II:

Individual Behavior – Diversity – Biographical Characteristics Ability – Implementing Diversity Management – Strategies – Attitudes & Job Satisfaction - Personality – Theories of Personality – Perception – Process of Perception – Perception & Individual Decision Making – Motivation from concepts to Applications.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand the concept of Organizational Behavior. **L1**
- Contrast and compare Individual Behavior and attitude. **L2**

UNIT – III:

Group Behavior – Foundations of Group Behaviour – Defining and Classifying Groups – Stages of Group Development – Group Properties – Roles – Norms – Status, Size and Cohesiveness – Group Decision Making – Understanding Work Teams – Types of Teams – Creating Effective Teams.

Learning Outcomes:

At the end of this unit, the student will be able to

- Know the concept of Group Dynamics. **L1**
- Contrast and compare Group behavior and group development. **L2**

UNIT – IV:

Leadership and Motivational Theories: Leadership Theories – Characteristic of effective leader – Finding and Creating Effective Leaders – Power & Polities. Introduction to motivation, Maslow's Hierarchy of Needs, Two- factor theory of Motivation, Mcdregers theory of motivational Model.

Learning Outcomes:

At the end of this unit, the student will be able to

- Contrast and compare Traits theory and Managerial Grid. **L1**
- Know the difference between Transactional and Transformational Leadership. **L2**

UNIT – V:

Foundation of Organizational Structure: Conflicts & Negotiations – Organization Structure – Organization Change & Stress Management – Self Management – Managing Careers.

Learning Outcomes:

At the end of this unit, the student will be able to

- Know the importance of organizational change and development. **L1**
- Apply change management in the organization. **L2**

Text Books:

1. Stephen P. Robbins, Timothy: Organizational Behaviour, Pearson 14th Edition, 2012.
2. Dr. Anjali Ghanekar, Organizational Behaviour Concepts & Cases, Everest, 19th Edition, 2013.

Reference Books:

1. Mirza S Saiyadain, Cases in Organizational Behavior , TMH,2011.
2. Gerard H.Seijts, Cases in Organizational Behavior, Sage,2008.
3. Nelson, Quick and Khandelwala, ORGB, 2/e, Cengage, 2012.
4. P.G. Aquinas: Organizational Behaviour Concepts, Realities, Application & Challenges, 2nd Edition, Excel Books 2012.

Course Outcomes:

At the end of this Course the student will be able to

- To bring about the through understanding of entrepreneurship and constraints for the growth of entrepreneurial culture. **L1**
- To demondtrate knowledge in entrepreneurship development. **L2**
- To understand the concept of entrepreneushiptaining and various entrepreneurship training institutes in India. **L3**
- To be able to demontrate progressive learning in the project report and ownership structures. **L4**
- To be able to demontrate progressive learning in the project report and ownership structures. **L5**

B.Tech IV Year I Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

19AEC71- VLSI DESIGN

L	T	P	C
3	0	0	3

Course Objectives: The objectives of the course are to make the students learn about

- To give exposure to different steps involved in the fabrication of ICs and electrical properties of MOS devices.
- To know the design rules in drawing the layout of any logic circuit.
- To design different types of logic gates using CMOS inverter and analyze their transfer characteristics.
- To learn the concepts to design building blocks of data path of any system using gates.
- Understand basic programmable logic devices and testing of CMOS circuits.

UNIT – I:

Introduction: Introduction to IC Technology – MOS, PMOS, NMOS, CMOS & BiCMOS

Basic Electrical Properties: Basic Electrical Properties of MOS and BiCMOS Circuits: Ids-Vds relationships, MOS transistor threshold Voltage, gm, gds, Figure of merit ωo; Pass transistor, NMOS Inverter, Various pull ups, CMOS Inverter analysis and design, Bi-CMOS Inverters.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand different steps involved in the fabrication of ICs and electrical properties of MOS devices. **L2**
- Summarize the operation of NMOS, CMOS and BiCMOS inverters. **L2**

UNIT – II:

VLSI Circuit Design Processes: VLSI Design Flow, MOS Layers, Stick Diagrams, Design Rules and Layout, 2 µm CMOS Design rules for wires, Contacts and Transistors Layout Diagrams for NMOS and CMOS Inverters and Gates, Scaling of MOS circuits.

Learning Outcomes:

At the end of this unit, the student will be able to

- Know the VLSI design flow and stick diagrams. **L1**
- Understand the design rules in drawing the layout of any logic circuit. **L2**

UNIT – III:

Gate Level Design: Logic Gates and Other complex gates, Switch logic, Alternate gate circuits, Time delays, Driving large capacitive loads, Wiring capacitance, Fan – in, Fan – out, Choice of layers.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand different types of logics in gate level design. **L2**
- Learn and compare different performance parameters in gate level design. **L1**

UNIT – IV:

Data Path Subsystems: Subsystem Design, Shifters, Adders, ALUs, Multipliers, Parity generators, Comparators, Zero/One Detectors, Counters.

Array Subsystems: SRAM, DRAM, ROM, Serial Access Memories.

Learning Outcomes:

At the end of this unit, the student will be able to

- Describe the building blocks of data path of any system using gates. **L1**
- Summarize different types of Semiconductor memories. **L2**

UNIT – V:

Programmable Logic Devices: PLAs, FPGAs, CPLDs, Standard Cells, Programmable Array Logic, Design Approach, Parameters influencing low power design.

CMOS Testing: CMOS Testing, Need for testing, Test Principles, Design Strategies for test, Chip level Test Techniques.

Learning Outcomes:

At the end of this unit, the student will be able to

- Explain different programmable logic devices. **L1**
- Understand the testing processes of CMOS circuits. **L2**

Text Books:

1. Kamran Eshraghian, Eshraghian Dougles and A. Pucknell, "Essentials of VLSI circuits and systems", PHI, 2005 Edition
2. Neil H. E Weste, David Harris and Ayan Banerjee,"CMOS VLSI Design – A Circuits and Systems Perspective", 3rd Ed, Pearson, 2009.
3. M. Michael Vai, "VLSI Design", 2001, CRC Press.

Reference Books:

1. Ming-BO Lin, "Introduction to VLSI Systems: A Logic, Circuit and System Perspective", CRC Press, 2011
2. John .P. Uyemura, "CMOS logic circuit Design", Springer, 2007.
3. Wayne Wolf, "Modern VLSI Design", Pearson Education, 3rd Edition, 1997.
4. K .Lal Kishore and V. S. V. Prabhakar, "VLSI Design", I.K International, 2009.
5. Mead & Convey, "Introduction to VLSI", BS Publications, 2010.

Course Outcomes:

At the end of this Course the student will be able to

- Understand different steps involved in the fabrication of ICs and electrical properties of MOS devices. **L2**
- Know the design rules in drawing the layout of any logic circuit. **L1**
- Describe different types of logic gates using CMOS inverter and their transfer characteristics. **L1**
- Learn the concepts to design building blocks of data path of any system using gates. **L1**
- Gain knowledge about basic programmable logic devices and testing of CMOS circuits. **L1**

B.Tech IV Year I Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

19AEC72- ELECTRONIC MEASUREMENTS AND INSTRUMENTATION

L	T	P	C
3	0	0	3

Course Objectives: The objectives of the course are to make the students learn about

- To know about the performance characteristics of instruments and measurement of electrical quantities.
- To understand the construction, working and applications of different types of CRO"s.
- To analyze the working of different types of bridges.
- To study the working of signal & function generators and logic & spectrum analyzers.
- To analyze the working of sensors and transducers in measuring physical parameters.

UNIT – I:

Performance characteristics of Instruments: Static characteristics, Accuracy, Precision, Resolution, Sensitivity, static and dynamic calibration, Errors in Measurement, and their statistical analysis, dynamic characteristics-speed of Response, fidelity, Lag and dynamic error. DC ammeters, DC voltmeters-multirange, range extension/solid state and differential voltmeters, AC voltmeters–multirange, range extension. Thermocouple type RF ammeter, ohm meters, series type, shunt type, multimeter for voltage, current and resistance measurements.

Learning Outcomes:

At the end of this unit, the student will be able to

- Learn about the performance characteristics of the instruments. **L1**
- Understand the working of different types of ammeters, voltmeters and multimeters. **L2**

UNIT – II:

Oscilloscopes: Introduction, Basic Principle, Standard specifications of CRO,CRT features, vertical and horizontal amplifiers, horizontal and vertical deflection systems, sweep trigger pulse, delay line, sync selector circuits, probes for CRO – active, passive, and attenuator type, triggered sweep CRO, and Delayed sweep, dual trace/beam CRO, Measurement of amplitude, frequency and phase (Lissajous method). Principles of sampling oscilloscope, storage oscilloscope, and digital storage oscilloscope, Digital frequency counters, time & Period measurements.

Learning Outcomes:

At the end of this unit, the student will be able to

- Grasp the construction and working of different types of oscilloscopes. **L1**
- Use CRO to measure the amplitude, frequency, phase and time period of given signals. **L3**

UNIT – III:

Bridges: DC Bridges for Measurement of resistance: Wheat stone bridge, Kelvin's Bridge, AC Bridges for Measurement of inductance- Maxwell's bridge, Hay's Bridge, Anderson bridge. Measurement of capacitance - Schearing Bridge, Wien Bridge. Errors and precautions in using bridges.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand the construction and working of different types of bridges. **L2**
- Measure parameters like resistance, capacitance, and inductance using bridges. **L3**

UNIT – IV:

Signal Generators: Signal generator-fixed and variable, AF oscillators, function generators, pulse, random noise, sweep, and arbitrary waveform generators, their standards, specifications and principles of working (Block diagram approach).Wave analyzers, Harmonic distortion analyzers, Spectrum analyzers, and Logic analyzers.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand the working and applications of signal generators and function generators. **L2**
- Learn the working and applications of different types of wave analyzers. **L1**

UNIT – V:

Sensors and Transducers - Active and passive transducers: Measurement of displacement (Resistance, capacitance, inductance; LVDT) Force (strain gauges) Pressure (piezoelectric transducers) Temperature (resistance thermometers, thermocouples and thermistors), Velocity, Acceleration, Vibration, pH measurement Signal Conditioning Circuits.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand the basic working principle and applications of different sensors and transducers. **L2**
- Measure physical parameters using different types of sensors and transducers. **L1**

Text Books:

1. A.D. Helfrick and W.D. Cooper, "Modern Electronic Instrumentation and Measurement Techniques", 5^{th} Edition, PHI, 2002.
2. H.S.Kalsi, "Electronic Instrumentation", 2^{nd} edition, Tata McGraw Hill, 2004.

Reference Books:

1. David A. Bell, "Electronic Instrumentation & Measurements", 2^{nd} Edition, PHI, 2003.
2. K. Lal Kishore, "Electronic Measurements & Instrumentations", Pearson Education, 2009.

Course Outcomes:

At the end of this Course the student will be able to

- Learn about the performance characteristics of instruments and measurement of electrical quantities. **L1**
- Understand the construction, working and applications of different types of CRO"s. **L2**
- Compare the working of different types of bridges. **L2**
- Know the working of signal & function generators and logic & spectrum analyzers. **L2**
- Grasp the working of sensors and transducers in measuring physical parameters. **L2**

B.Tech IV Year I Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

19AEC74a – RADAR SYSTEMS

(Professional Elective - III)

L	T	P	C
3	0	0	3

Course Objectives: The objectives of the course are to make the students learn about

- Understand the basic working principle of Radar and target detection procedure.
- Learn about the working and applications of CW and Frequency modulated Radar.
- Comprehend the working and applications of MTI and Pulse Doppler Radar
- Understand different methods of tracking a target and their limitations.
- Analyze the effect of noise at the receiver and uses of phased array antennas.

UNIT – I:

Basics of Radar: Introduction, Maximum Unambiguous Range, Simple form of Radar Equation, Radar Block Diagram and Operation, Radar Frequencies and Applications, Prediction of Range Performance, Minimum Detectable Signal, Receiver Noise, Modified Radar Range Equation, Illustrative Problems. Radar Equation: SNR, Envelope Detector, False Alarm Time and Probability, Integration of Radar Pulses, Radar Cross Section of Targets (simple targets - sphere, cone-sphere), Transmitter Power, PRF and Range Ambiguities, System Losses (qualitative treatment), Illustrative Problems.

Learning Outcomes:

At the end of this unit, the student will be able to

- Learn the basic working principle of Radar and target detection procedure. **L1**
- Understand the target detection procedure using a Radar. **L2**

UNIT – II:

CW and Frequency Modulated Radar: Doppler Effect, CW Radar – Block Diagram, Isolation between Transmitter and Receiver, Non-zero IF Receiver, Receiver Bandwidth Requirements, Applications of CW radar, Illustrative Problems.FM-CW Radar, Range and Doppler Measurement, Block Diagram and Characteristics (Approaching/ Receding Targets), FM-CW altimeter, Multiple Frequency CW Radar.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand the concept and application of Doppler Effect. **L2**
- Appreciate the working and applications of CW and Frequency modulated Radar. **L1**

UNIT – III:

MTI and Pulse Doppler Radar: Introduction, Principle, MTI Radar with - Power Amplifier Transmitter and Power Oscillator Transmitter, Delay Line Cancellers – Filter Characteristics, Blind Speeds, Double Cancellation, And Staggered PRFs. Range Gated Doppler Filters, MTI Radar Parameters, Limitations to MTI Performance, MTI versus Pulse Doppler radar.

Learning Outcomes:

At the end of this unit, the student will be able to

- Know the working and applications of MTI Radar. **L1**
- Compare the performances of MTI and Pulse Doppler Radar. **L2**

UNIT – IV:

Tracking Radar : Tracking with Radar, Sequential Lobing, Conical Scan, Monopulse Tracking Radar – Amplitude Comparison Monopulse (one- and two-coordinates), Phase Comparison Monopulse, Tracking in Range, Acquisition and Scanning Patterns, Comparison of Trackers.

Learning Outcomes:

At the end of this unit, the student will be able to

- Learn how to track a target using a Radar. **L1**
- Compare different methods of tracking a target. **L2**

UNIT – V:

Detection of Radar Signals in Noise: Introduction, Noise Figure and Noise Temperature, Matched Filter Receiver – Response Characteristics and Derivation, Correlation detection, Detection criteria, Detector Characteristics, Automatic Detection, Constant False Alarm Rate Receiver.

Radar Receivers: Displays – types. Duplexer – Branch type and Balanced type, Circulators as Duplexers. Introduction to Phased Array Antennas- Basic Concepts, Electronically Steered Phased Array Antennas, Phase Shifters, Frequency – scan Arrays, Radiation for Phased Array, Architecture for Phased Arrays. Radiation Pattern. Beam Steering and Beam Width changes.

Learning Outcomes:

At the end of this unit, the student will be able to

- Analyze the effect of noise at the receiver in Radar signals. **L4**
- Understand the uses of phased array antennas at the Radar receiver. **L2**

Text Books:

1. Merrill I. Skolnik, "Introduction to Radar Systems", 2nd Edition, TMH Special Indian Edition, 2007.
2. Byron Edde, "Radar Principals, Technology, Applications", Pearson Education, 1992.

Reference Books:

1. Peebles, "Radar Principles", Wiley, New York, 1998.
2. G.S.N.Raju, "Radar Engineering and Fundamentals of Navigational Aids", I. K. International Pvt. Ltd.
3. G. Sasi Bhushan Rao, " Microwave and Radar Engineering", Pearson Education, 2014

Course Outcomes:

At the end of this Course the student will be able to

- Learn the basic working principle of Radar and target detection procedure. **L2**
- Know the working and applications of CW and Frequency modulated Radar. **L2**
- Gain the knowledge of about MTI and Pulse Doppler Radar. **L1**
- Understand different methods of tracking a target and their limitations. **L2**
- Analyze the effect of noise at the receiver and uses of phased array antennas. **L4**

B.Tech IV Year I Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

19AEC74b- RF CIRCUIT DESIGN

(Professional Elective - III)

L	T	P	C
3	0	0	3

Course Objectives: The objectives of the course are to make the students learn about

- To analyze RF components, circuits and networks.
- To understand the concept of Impedance matching and biasing networks.
- To analyze different types of RF Active components and Filters.
- To design and analyze the characteristics of RF Amplifiers.
- To analyze the characteristics of oscillators and mixers.

UNIT – I:

RF Electronic Components, Circuits & Networks : The Electromagnetic frequency bands and their applications, units and Physical Constants, Microwave bands, RF behavior of Passive components: Tuned resonant circuits, Varactors, Inductors and Capacitors, Voltage and Current in capacitor circuits. Microstrip Transmission Lines- types, Special Termination Conditions- sourced and Loaded Transmission Lines. The Smith Chart, Inter connectivity networks, Network properties and Applications, Scattering Parameters.

Learning Outcomes:

At the end of this unit, the student will be able to

- Analyze RF components and circuits. **L4**
- Understand special termination conditions in transmission lines and network properties. **L2**

UNIT – II:

Matching Network and Biasing

Impedance matching using discrete components- Two component, T and π matching networks, Microstrip line matching networks- Single stub and Double stub matching networks, Amplifier classes of Operation and biasing networks- BJT and FET biasing networks.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand the concept of Impedance matching. **L2**
- Learn the operation of biasing networks. **L1**

UNIT – III:

Active RF Components

Filter basics–Lumped filter design– Distributed Filter Design–Diplexer Filters-Crystal and Saw filters-Active Filters - Tunable filters. RF Diodes – BJTs- FETs and Models.

Learning Outcomes:

At the end of this unit, the student will be able to

- Analyze different types of RF Active components. **L4**
- Learn the design and analysis of different types of RF Filters. **L1**

UNIT – IV:

RF Amplifier Design

Characteristics of Amplifiers- Amplifier power relations and Circuit Configurations, Stability Considerations, Small Signal amplifier design, Power amplifier design, Broadband, High Power, multistage amplifiers, Low noise amplifiers, VGA Amplifiers.

Learning Outcomes:

At the end of this unit, the student will be able to

- Learn the power relations and stability considerations. **L1**
- Design and analyze the characteristics of different types RF Amplifiers. **L6**

UNIT – V:

Oscillators and Mixers

Oscillator basics, Low phase noise oscillator design, High frequency Oscillator configuration, LC Oscillators, VCOs, Gunn Element Oscillator, PLL Synthesizer. Basic characteristics of mixer-Active mixers, Image Reject and Harmonic mixers, Frequency domain considerations

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand the basics and design of oscillators. **L2**
- To analyze the characteristics of mixers. **L4**

Text Books:

1. Reinhold Ludwing and Pavel Bretchko, "RF Circuit design: Theory and applications", Pearson Education Asia Publication, New Delhi 2001.
2. Devendra K.Misra, "Radio Frequency and Microwave Communication Circuits– Analysis and Design", Wiley Student Edition, John Wiley & Sons.

Reference Books:

1. Mathew M. Radmangh, "Radio frequency and Microwave Electronics", PE Asia Publ,2001.
2. Christopher Bowick, Cheryl Aljuniand John Biyler, "RF Circuit Design–Elsevier Science", 2008.

Course Outcomes:

At the end of this Course the student will be able to

- Analyze different types of RF components, circuits and networks. **L4**
- Learn the concept of Impedance matching and biasing networks. **L1**
- Analyze different types of RF Active components and Filters. **L4**
- Design and analyze the characteristics of RF Amplifiers. **L6**
- Analyze the characteristics of oscillators and mixers. **L4**

B.Tech IV Year I Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

19AEC74c- BIO-MEDICAL INSTRUMENTATION

(Professional Elective-III)

L	T	P	C
3	0	0	3

Course Objectives: The objectives of the course are to make the students learn about

- To gain an understanding of the fundamentals of Biomedical Instrumentation and study about biomedical sensors and electrodes.
- To know about the Cardiovascular System and different types of Cardiovascular Measurements.
- To understand the techniques used for measuring various parameters in the Respiratory System of the body.
- To acquire the information about bio-telemetry and various components of biotelemetry system.
- To learn about the Electrical safety of Medical Equipment & Modern Imaging Systems.

UNIT – I:

Sources of Bioelectric Potentials and Electrodes: Physiological systems of the body, Bioelectric Potentials, Resting and Action Potentials, Propagation of Action Potentials. Electrodes: Electrode theory, Bio Potential Electrodes, Biochemical Transducers, Introduction to bio-medical signals.

Learning Outcomes:

At the end of this unit, the student will be able to

- Learn the fundamentals of Biomedical Instrumentation. **L1**
- Know about the biomedical sensors and electrodes. **L1**

UNIT – II:

The Cardiovascular System: The Heart and Cardiovascular System, The Heart, Blood Pressure, Characteristics of Blood Flow, Heart Sounds, Cardio Vascular Measurements –Electro cardiography, Measurement of Blood Pressure, Measurement of Blood Flow and Cardiac output, Plethysmography, Measurement of Heart Sounds. Event detection, P,Q,R,S & T-Wave sinECG, the first & second Heartbeats, ECG rhythm analysis, the di-crotic notch in the carotid pulse detection, analysis of exercise ECG, analysis of event related potentials, correlation analysis of EEG channels, correlation of muscular contraction.

Learning Outcomes:

At the end of this unit, the student will be able to

- Know about the Cardiovascular System. **L1**
- Compare different types of Cardiovascular Measurements. **L2**

UNIT – III:

Patient Care, Monitoring and Measurements in Respiratory System: The elements of Intensive Care Monitory, Diagnosis, Calibration and reparability of Patient Monitoring equipment, other instrumentation for monitoring patients, pacemakers, defibrillators. The physiology of respiratory system, tests and instrumentation for mechanics of breathing, respiratory therapy equipment, analysis of respiration.

Learning Outcomes:

At the end of this unit, the student will be able to

- Learn about the patient monitoring equipment. **L1**
- Understand how to measure various parameters in the Respiratory System of the body. **L2**

UNIT – IV:

Bio-Telemetry and Instrumentation for the Clinical Laboratory: Introduction to bio-telemetry, Physiological parameters adaptable to bio-telemetry, the components of biotelemetry system, implantable units, and applications of telemetry inpatient care. The blood, tests on blood cells, chemical test, automation of chemical tests.

Learning Outcomes:

At the end of this unit, the student will be able to

- Acquire the information about bio-telemetry system. **L1**
- Identify various components of biotelemetry system and their functioning. **L2**

UNIT – V:

X-Ray & Radioisotope Instrumentation and Electrical Safety of Medical Equipment: Generation of Ionizing radiation, instrumentation for diagnostic X-rays, special techniques, instrumentation for the medical use of radioisotopes, Radiation therapy. Physiological effects of electrical current, shock Hazards from electrical equipment, Methods of accident prevention.

Modern Imaging Systems: Tomography, Magnetic Resonance Imaging System, Ultrasonic Imaging System, Medical Thermography.

Learning Outcomes:

At the end of this unit, the student will be able to

- Gain knowledge about the Electrical safety of Medical Equipment. **L1**
- Understand different types of Imaging Systems. **L2**

Text Books:

1. C. Cromwell, F.J. Weibell and E.A. Pfeiffer, "Biomedical Instrumentation and Measurements", Pearson education 2nd Edition.
2. Rangaraj and M. Rangayya, "Biomedical signal analysis", Wiley Inter science – John willey & Sons Inc2nd Edition.

Reference Books:

1. R.S. Khandpur, "Hand Book of Bio-Medical Instrumentation", TMH, 3rd Edition.
2. Michael M. Domach, "Introduction to Bio-Medical Engineering", Pearson, 2nd Edition.
3. Joseph J.Carr and John M. Brown, "Introduction to Biomedical Equipment Technology", Prentice Hall 4th Edition.

Course Outcomes:

At the end of this Course the student will be able to

- Understand the fundamentals of Biomedical Instrumentation and the usage of biomedical sensors and electrodes. **L2**
- Know about the Cardiovascular System and different types of Cardiovascular Measurements. **L1**
- Understand the techniques used for measuring various parameters in the Respiratory System of the body. **L2**
- Acquire the information about bio-telemetry and various components of biotelemetry system. **L2**
- Learn about the Electrical safety of Medical Equipment &Modern Imaging Systems. **L1**

B.Tech IV Year I Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

19AEC76a- SATELLITE COMMUNICATIONS

(Professional Elective-IV)

L	T	P	C
3	0	0	3

Course Objectives: The objectives of the course are to make the students learn about

- To gain an understanding of the basic principles and applications of satellite communications.
- To learn about the satellite subsystems and analyze the link budget.
- To introduce to the working and applications of the systems used in the earth station.
- To study the different multiple access techniques used in satellite communications.
- To know the basic concepts of satellite navigation and working of global positioning system

UNIT – I:

Introduction to Satellite Communications: Origin of satellite communications, basic concepts of satellite communications, and frequency allocations for satellite services, applications, future trends of satellite communications. Orbital Mechanics look angle determination, orbital perturbations, orbit determination, launches and launch vehicles, orbital effects in communication systems performance.

Learning Outcomes:

At the end of this unit, the student will be able to

- Summarize the basic principles of satellite communications. **L2**
- Learn the Orbital Mechanics and applications of satellite communications. **L1**

UNIT – II:

Satellite Subsystems and Link Design: Attitude and orbital control system, Telemetry, Tracking, command and monitoring, power systems, communication subsystems, satellite antenna equipment reliability and space qualification. Basic transmission theory, system noise temperature and G/T ratio, design of down links, uplink design, design of satellite links for specified C/N, system design example.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand the functioning of various satellite subsystems. **L2**
- Learn the design of satellite links for specified C/N. **L1**

UNIT – III:

Earth Station Technology: Introduction, transmitters, receivers, Antennas, tracking systems, terrestrial interface, primary power test methods, comparison of LEO and GEO satellite systems in real world.

Learning Outcomes:

At the end of this unit, the student will be able to

- Know about the various systems used in the earth station. **L1**
- Compare the LEO and GEO satellite systems. **L2**

UNIT – IV:

Multiple Access: Frequency division multiple access (FDMA), Intermodulation, calculation of C/N, Time Division multiple access (TDMA) frame structure, examples. Satellite switched TDMA onboard processing, DAMA, code division multiple access (CDMA), spread spectrum transmission and reception.

Learning Outcomes:

At the end of this unit, the student will be able to

- Learn about the different multiple access techniques used in satellite communications. **L1**
- Understand the Satellite switched TDMA onboard processing. **L2**

UNIT – V:

Satellite Navigation & Global Positioning System: Radio and satellite navigation, GPS position location principles, GPS receivers and codes, satellite signal acquisition, GPS navigation message, GPS signal levels, GPS receiver operation, GPS C/A code accuracy, differential GPS.

Learning Outcomes:

At the end of this unit, the student will be able to

- Know about the basic concepts of satellite navigation. **L1**
- Understand the working and applications of global positioning system. **L2**

Text Books:

1. Timothi Pratt, Charles Bostian and Jeremy Allnutt, "Satellite communications", 2nd Edition, WSE, Wiley publications, 2003.
2. Wilbur L.Prichard, Robert A. Nelson and Henry G.Suyderhoud, "Satellite communications Engineering", 2nd Edition, Pearson Publications, 2003.

Reference Books:

1. Dennis Roddy, "Satellite communications", 2nd Edition, McGraw Hill, 1996.
2. K.N.Raja Rao, "Fundamentals of Satellite communications", PHI, 2004.

Course Outcomes:

At the end of this Course the student will be able to

- Understand the basic principles and applications of satellite communications. **L2**
- Learn about the satellite subsystems and know how to analyze the link budget. **L1**
- Appreciate the working and applications of the systems used in the earth station. **L2**
- Gain the knowledge about the multiple access techniques used in satellite communications. **L1**
- Understand the basic concepts of satellite navigation and working of global positioning system. **L2**

B.Tech IV Year I Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

19AEC76b- DIGITAL IMAGE PROCESSING

(Professional Elective-IV)

L	T	P	C
3	0	0	3

Course Objectives: The objectives of the course are to make the students learn about

- To learn the fundamentals of Image Processing and the image transforms used in image processing.
- To study the different types of filtering techniques used for image enhancement.
- To gain an understanding of image restoration techniques.
- To understand the techniques used for image segmentation and image restoration.
- To analyze various types of image compression methods.

UNIT – I:

Digital Image Fundamentals: Elements of digital image processing systems, An image model, Basic relationships between pixels and basic transformation, Image acquisition, sampling and quantization, Image file formats Two dimensional convolution, Two dimensional correlation, Two dimensional frequency responses.

Image Transforms: Study analysis with examples of 2D transforms, Transforms: DFT, DCT, Discrete Sine, Walsh, Hadamard, Slant, Haar, KLT, Radon, Hough, and Wavelet.

Learning Outcomes:

At the end of this unit, the student will be able to

- Learn the fundamentals of digital image processing. **L1**
- Analyze different types of image transforms in one and two dimensions. **L4**

UNIT – II:

Image Enhancement: Image enhancement through – point processing, Histogram processing, spatial filtering, Enhancement in frequency domain, image smoothing, image sharpening.

Learning Outcomes:

At the end of this unit, the student will be able to

- Explain the enhancements techniques in both spatial and frequency domain. **L3**
- Analyze various types of filters used in spatial and frequency domain. **L4**

UNIT – III:

Image Restoration: Noise distributions, Degradation model, Unconstrained and constrained restoration, Inverse filtering, minimum mean square error (Wiener) filtering, Constrained least square restoration.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand the image restoration procedure. **L2**
- Learn about the different types of image restoration filters. **L1**

UNIT – IV:

Image Segmentation and Recognition: Edge detection, Image segmentation: Region growing, Region splitting and merging, Edge linking, Morphological operations: Dilation, Erosion, Opening, Closing, Image recognition: Patterns and pattern classes, Matching by minimum distance classifier, Statistical classifier, Matching by correlation.

Learning Outcomes:

At the end of this unit, the student will be able to

- Learn the image segmentation techniques and their applications. **L1**
- Understand the various types of Image recognition patterns. **L2**

UNIT – V:

Image Compression: Need for image compression, Image coding, Huffman coding, Run length encoding, Arithmetic encoding, Vector Quantization, Block truncation coding, Transform coding: DCT, Wavelet, Image compression standards.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand the need for image compression. **L2**
- Analyze different types of image compression algorithms. **L4**

Text Books:

1. R. C. Gonzalez and R.E. Woods, "Digital Image Processing", 3rd Edition, Addison Wesley/Pearson education, 2010.
2. A. K. Jain, "Fundamentals of Digital Image processing", PHI, 1994.

Reference Books:

1. Rafael C. Gonzalez, Richard E woods and Steven L. Eddins, "Digital Image processing using MATLAB", 2nd Edition, Tata McGraw Hill, 2010.
2. William K. Pratt, "Digital Image Processing", 3rd Edition, John Wilely, 2004.

Course Outcomes:

At the end of this Course the student will be able to

- Relate the fundamentals of Image Processing and the image transforms. **L3**
- Correlate different types of filtering techniques used for image enhancement. **L3**
- Gain an understanding of image restoration techniques. **L1**
- Understand the techniques used for image segmentation and image restoration. **L2**
- Analyze various types of image compression methods. **L4**

B.Tech IV Year I Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

19AEC76c- DSP PROCESSORS & ARCHITECTURES

(Professional Elective-IV)

L	T	P	C
3	0	0	3

Course Objectives: The objectives of the course are to make the students learn about

- To learn the basics of DSP systems and compute the accuracy in implementations.
- To understand the architectural features of programmable DSP Processors and execution control.
- To study the commercial DSP Processing devices.
- To analyze the implementation of DSP and FFT algorithms.
- To learn the interfacing techniques of memory and I/O devices to programmable DSP Processors.

UNIT – I:

Introduction to Digital Signal Processing: Introduction, a Digital signal-processing system, the sampling process, Discrete time sequences. Discrete Fourier Transform (DFT) and Fast Fourier Transform (FFT), linear time-invariant systems, Digital filters, Decimation and interpolation, Analysis and Design tool for DSP Systems MATLAB, DSP using MATLAB.

Computational Accuracy in DSP Implementations: Number formats for signals and coefficients in DSP systems, Dynamic Range and Precision, Sources of error in DSP implementations, A/D Conversion errors, DSP Computational errors, D/A Conversion Errors, Compensating filter.

Learning Outcomes:

At the end of this unit, the student will be able to

- Analyze linear time-invariant systems and realize various digital filters. **L4**
- Know about various sources of error in DSP implementations. **L1**

UNIT – II:

Architectures for Programmable DSP Devices: Basic Architectural features, DSP Computational Building Blocks, Bus Architecture and Memory, Data Addressing Capabilities, Address Generation Unit, Programmability and Program Execution, Speed Issues, Features for External interfacing.

Execution Control and Pipelining: Hardware looping, Interrupts, Stacks, Relative Branch support, Pipelining and Performance, Pipeline Depth, Interlocking, Branching effects, Interrupt effects, Pipe line Programming models.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand the basic architectural features of DSP devices. **L2**
- Analyze data addressing capabilities and execution control. **L4**

UNIT – III:

Programmable Digital Signal Processors : Commercial Digital signal-processing Devices, Data Addressing modes of TMS320C54XX DSPs, Data Addressing modes of TMS320C54XX Processors, Memory space of TMS320C54XX Processors, Program Control, TMS320C54XX instructions and Programming, On- Chip Peripherals, Interrupts of TMS320C54XX processors, Pipeline Operation of TMS320C54XX Processors.

Learning Outcomes:

At the end of this unit, the student will be able to

- Explain various data addressing modes of TMS320C54XX processors. **L3**
- Understand the program control and pipeline operation of TMS320C54XX processors. **L2**

UNIT – IV:

Implementations of Basic DSP Algorithms : The Q-notation, FIR Filters, IIR Filters, Interpolation Filters, Decimation Filters, PID Controller, Adaptive Filters, 2-D Signal Processing.

Implementation of FFT Algorithms : An FFT Algorithm for DFT Computation, A Butterfly Computation, Overflow and scaling, Bit-Reversed index generation, An 8-Point FFT implementation on the TMS320C54XX, Computation of the signal spectrum.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand the structural differences between FIR filters and IIR filters. **L2**
- Implement the 8-point FFT on TMS320C54XXprocessor. **L6**

UNIT – V:

Interfacing Memory and I/O Peripherals to Programmable DSP Devices: Memory space organization, External bus interfacing signals, Memory interface, Parallel I/O interface, Programmed I/O, Interrupts and I/O, Direct memory access (DMA). A Multichannel buffered serial port (McBSP), McBSP Programming, a CODEC interface circuit, CODEC programming, A CODEC-DSP interface example.

Learning Outcomes:

At the end of this unit, the student will be able to

- Interface the memory to programmable DSP Processors. **L4**
- Interface the I/O devices in different modes to programmable DSP Processors. **L4**

Text Books:

1. Avtar Singh and S. Srinivasan, "Digital Signal Processing Implementation", 1st Edition, Cengage Learning, 2004.
2. Lapsley et al. S. Chand and Co, "DSP Processor Fundamentals, Architectures & Features", 2000.

Reference Books:

1. B. Venkata Ramani and M. Bhaskar, "Digital Signal Processors, Architecture, Programming and Applications", TMH, 2004.
2. Jonatham Stein, "Digital Signal Processing: A Computer Science Perspective", John Wiley, 2000

Course Outcomes:

At the end of this Course the student will be able to

- Summarize the basics of DSP systems and computation of accuracy in implementation. **L2**
- Understand the architectural features of programmable DSP Processors and execution control. **L2**
- Select and use the commercial DSP Processing devices for specific applications. **L3**
- Analyze the implementation of DSP and FFT algorithms. **L4**
- Interface memory and I/O devices to programmable DSP Processors. **L4**

B.Tech IV Year I Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

19ACE75a-ARCHITECTURE AND TOWN PLANNING

(Open Elective-III)

L	T	P	C
3	0	0	3

Course Objectives: The objectives of the course are to make the students learn about

- To know the western architecture and Indian architecture and also to gain knowledge on the principles of architectural design and historical background of town planning.

A) ARCHITECTURE:

UNIT – I:

At the end of this unit, the student will be able to

History of Architecture:

a) Western Architecture: Egyptian, Greek, Roman Architectures; influences- Comparative Analysis Orders

b) Indian Architecture: Vedic age - Indus Valley civilization - Buddhist period; stambas, Slenstas. Roranas, Chaityans, Viharas with one example for each Hindu temples - Evaluation of Dravidian and Indo Aryan Styles - Principle factors. Temple of Aibole, Mahabalipuram, Madurai, Deograph, Bhuvaneshwar, Mount Abu.

c) Indo - Sarsanic Architecture; Mosque - Place- FortTomb

Learning Outcomes:

Understand the different architectures of Indian and western countries

Understand the various principle factors of architecture

UNIT – II:

Architectural Design:

a) Principle of designing : Composition of plan Relationship between plan and elevation elements, form, surface Mass, Texture, Color,Tone.

b) Principle of Compositions: Unity, contrast, proportion, scale, Bab Rhuthm, character. Principles of Planning a Residence; Site Orientation prospect, Grouping, circulation, privacy, services and otherfactors

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand the design pricnciples and compositions of architecture

UNIT – III:

Introduction of Post-classic Architecture and contribution of eminent architects to modern period.Brief summary of post - classic architecture - Indian and Western Architectural contribution of Edward Lutyens, Le Corbusier), Frank Lloyd Wrigt, Walter Groping, Vender Rohe, Caarihan, Nervi, Oscar Niemyer, Edward Durell stone

Learning Outcomes:

At the end of this unit, the student will be able to

- Obtain the knowledge of contribution of different architects in architecture

B) TOWNPLANNING:

UNIT – IV:

Historical Back Ground: Town planning in India - town plans of Magad - town plans of ancient Indian towns; Mourya, Pataliputravijayanagara, Delhi.Town planning in the West-town plans of Acropolis, Rome, Paris, London

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand the need of town planning
- Knowledge on planning of different towns in India and other countries

UNIT – V:

Components of Planning;

a) Zoning
b) Roads and road Traffic.
c) Housing-Slums, Parks, Playgrounds.
d) Public Utility Services.
e) Surveys and maps for planning.
f) Neighbourhood Planning

Planning New town, planning standards, National and regional Planning, town planning and legislation.Garden cities and satellite town

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand the different components of town planning
- Knowledge on national standards in country and town planning

Text Books:

Reference Books:

A) ARCHITECTURE

1. Indian Architecture – Vol:- I and II by Percy Brown, Taraporevala Publications, Bombay.
2. Planning and 'Design of Building -Section of Architecture byY.S.Sane.
3. Modern Architecture and Design by Nikolans,Pevshar.
4. Modern Ideal Hol1 1nes for India byR.S.Deshpande.

B) TOWNPLANNING

1. Town and Country .Planning - A.J.Brown andH.M.Sherrard.
2. Town Design .-FederikGibbard, Architectural press,London.
3. National Building Code ofIndia.
4. Town Planning in India - Town and Country Planning Organisation, New Delhi1962.
5. Regional Planning - Misra R.P., Mysore University.
6. Urban and Regional Planning; Principles and case studies by K.S.Rama Gouda, Mysore University Publications.
7. Town and Country Planning - P. Abercrombe, Oxford University press.

Course Outcomes:

At the end of this Course the student will be able to

- Learn the importance of architecture and its principles in designing
- The different architectures till date and the contribution of different architects
- The necessity of town planning and different components of planning

B.Tech IV Year I Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

19ACE75b-EXPERIMENTAL STRESS ANALYSIS

(Open Elective-III)

L	T	P	C
3	0	0	3

Course Objectives: The objectives of the course are to make the students learn about

- To bring awareness on experimental method of finding the response of the structure to different types of load
- Demonstrates principles of experimental approach
- Teaches regarding the working principles of various strain gauges
- Throws knowledge on strain rosettes and principles of non destructive testing of concrete
- Gives an insight into the principles of photo elasticity

UNIT – I:

PRINCIPLES OF EXPERIMENTAL APPROACH: - Merits of Experimental Analysis Introduction, uses of experimental stress analysis advantages of experimental stress analysis, Different methods –Simplification of problems

Learning Outcomes:

At the end of this unit, the student will be able to

- Demonstrate the merits and principles of experimental approach
- Give an insight into the uses and advantages of experimental stress analysis

UNIT – II:

STRAIN MEASUREMENT USING STRAIN GAUGES:-

Definition of strain and its relation of experimental Determinations Properties of Strain Gauge Systems-Types of Strain Gauges – Mechanical, Acoustic and Optical Strain Gauges. Introduction to Electrical strain gauges - Inductance strain gauges – LVDT – Resistance strain gauges – various types –Gauge factor – Materials of adhesion base.

Learning Outcomes:

At the end of this unit, the student will be able to

- Introduce various strain gauge systems and their properties
- Give information regarding the gauge factor and materials of adhesion bases

UNIT – III:

STRAIN ROSSETTES AND NON – DESTRUCTIVE TESTING OF CONCRETE:- Introduction – the three elements Rectangular Rosette – The Delta Rosette Corrections for Transverse Strain Gauge. Ultrasonic Pulse Velocity method –Application to Concrete. Hammer Test – Application to Concrete.

Learning Outcomes:

At the end of this unit, the student will be able to

- Introduces various strain rosettes and corrections for strain gauges
- Gives an insight into the destructive and non destructive testing of concrete

UNIT – IV:

THEORY OF PHOTOELASTICITY: - Introduction –Temporary Double refraction – The stress Optic Law –Effects of stressed model in a polariscope for various arrangements – Fringe Sharpening. Brewster"s Stress Optic law.

Learning Outcomes:

At the end of this unit, the student will be able to

- Introduces stress optic laws.
- Gives the arrangements and working principles of polariscope

UNIT – V:

TWO DIMENSIONAL PHOTOELASTICITY: - Introduction – Iso-chromatic Fringe patternsIsoclinic Fringe patterns passage of light through plane Polariscope and Circular polariscope Isoclinic Fringe patterns – Compensation techniques – Calibration methods – Separation methods – Scaling Model to prototype Stresses – Materials for photo – Elasticity Properties of Photoelastic Materials

Learning Outcomes:

At the end of this unit, the student will be able to

- Introduces the understanding of different fringe patterns.
- Introduces model analysis and properties of photo elastic materials

Text Books:

1. J.W.Dally and W.F.Riley, "Experimental stress analysis College House Enterprises"
2. Dr.Sadhu Singh, "Experimental stress analysis", khanna Publishers

Reference Books:

1. U.C.Jindal, "Experimental Stress analysis", Pearson Publications.
2. L.S.Srinath, "Experimental Stress Analysis", MC.Graw Hill Company Publishers.

Course Outcomes:

At the end of this Course the student will be able to

- The student will be able to understand different methods of experimental stress analysis
- The student will be able to understand the use of strain gauges for measurement of strain
- The student will be exposed to different Non destructive methods of concrete
- The student will be able to understand the theory of photo elasticity and its applications in analysis of structures

B.Tech IV Year I Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

19ACE75c-FINITE ELEMENT ANALYSIS

(Open Elective-III)

L	T	P	C
3	0	0	3

Course Objectives: The objectives of the course are to make the students learn about

- Familiarize basic principles of finite element analysis procedure.
- Explain theory and characteristics of finite elements that represent engineering structures.
- Apply finite element solutions to structural, thermal, dynamic problem
- Learn to model complex geometry problems and solution techniques

UNIT – I:

INTRODUCTION: Concepts of FEM – Steps involved – merits & demerits – energy principles – Discretization – Rayleigh –Ritz method of functional approximation.

PRINCIPLES OF ELASTICITY: Equilibrium equations – strain displacement relationships in matrix form – Constitutive relationships for plane stress, plane strain and Axi-symmetric bodies of revolution with axi-symmetric loading.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand the concept of nodes and elements.(L2)
- Understand the general steps of finite element methods.(l2)
- Understand the role and significance of shape functions in finite element formulations (l2)

UNIT – II:

ONE DIMENSIONAL & TWO DIMENSIONAL ELEMENTS: Stiffness matrix for bar element – shape functions for one dimensional elements – one dimensional problems .Two Dimensional Elements - Different types of elements for plane stress and plane strain analysis – Displacement models – generalized coordinates – shape functions – convergent and compatibility requirements – Geometric invariance – Natural coordinate system – area and volume coordinates

Learning Outcomes:

At the end of this unit, the student will be able to

- Explain the formulation of one dimensional and two – dimensional elements (L2)
- Apply the formulation techniques to solveone dimensional two – dimensional problems (L2)
- Formulate and solve axisymmetric problems.(L6)

UNIT – III:

GENERATION OF ELEMENT : Generation of element stiffness and nodal load matrices for 3-node triangular element and four noded rectangular elements.

Learning Outcomes:

At the end of this unit, the student will be able to

Apply the formulation techniques to solve problems using triangle and quadrilateral elements. (L3)

UNIT – IV:

ISOPARAMETRIC FORMULATION : Concepts of, isoparametric elements for 2D analysis – formulation of CST element, 4 –Noded and 8-noded iso-parametric quadrilateral elements – Lagrangian and Serendipity elements. **AXI-SYMMETRIC ANALYSIS:** Basic principles-Formulation of 4-noded iso-parametric axi-symmetric element

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand concepts of isoparametric elements(L1)
- Formulate and solve axisymmetric problems.(L6)

UNIT – V:

SOLUTION TECHNIQUES: Numerical Integration, Static condensation, assembly of elements and solution techniques for static loads

Learning Outcomes:

At the end of this unit, the student will be able to

Text Books:

1. Finite Element Analysis for Engineering and Technology, Tirupathi R Chandraputla, Universities Press Pvt Ltd, Hyderabad.2003.
2. Finite Element analysis – Theory & Programming by C.S.Krishna Murthy- Tata Mc.Graw Hill Publishers

Reference Books:

1. Finite element analysis and procedures in engineering by H.V.Lakshminaryana, 3rd edition, universities press,Hyderabad
2. Finite element analysis in Engineering Design by S.Rajasekharan, S.Chand Publications, NewDelhi
3. Finite element analysis by S.S. Bhavakatti-New age internationalpublishers

Course Outcomes:

At the end of this Course the student will be able to

- Demonstrate the differential equilibrium equations and theirrelationship
- Apply numerical methods tofem
- Demonstrate the displacement models and loadvectors
- Compute the stiffness matrix for isoperimetricelements
- Analyze plane stress and plane strainproblems

B.Tech IV Year I Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

19AEE75a- ELECTRICAL ENGINEERING MATERIALS

(Open Elective-III)

L	T	P	C
2	0	0	2

Course Objectives: The objectives of the course are to make the students learn about

- Classification of materials.
- Properties of materials and its applications.
- Domestic wiring and earthling
- Concept of polarization and dipolar polarization
- Classification of materials.

UNIT – I: Conducting Materials **10 Hrs**

Introduction – classification of materials – Metals and Non metals, physical, thermal, mechanical and electrical properties of materials–classification of electrical materials–concept of atom – electron configuration of atom, conductors, general properties of conductors, factors effecting resistivity of electrical materials–electrical / mechanical / thermal properties of copper, aluminum, iron, steel, lead, tin and their alloys–applications.

Learning Outcomes:

At the end of this unit, the student will be able to

1. Understand the classification of conducting materials. **L1**
2. Analyze the properties of different conducting materials **L2**

UNIT – II: Dielectric and High Resistivity Materials **10 Hrs**

Introduction–solid, liquid and gaseous di electrics, leakage current, permittivity, dielectric constant, dielectric loss –loss angle –loss constant, Breakdown voltage and di electric strength of –solid, liquid and gaseous dielectrics, effect of break down–electrical and thermal effects, Polarization – electric, ionic and dipolar polarization. Effect of temperature and Frequency on dielectric constant of polar dielectrics. High Resistivity materials – electrical / thermal /mechanical properties of Manganin, Constantan, Nichrome, Tungsten, Carbon and Graphite and their applications in electrical equipment.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand the classification of di electric and high resistivity materials. **L1**
- Analyze the properties of di electric and high resistivity materials **L2**

UNIT – III: Solid Insulating Materials **10 Hrs**

Introduction–characteristics of a good electrical insulating materials–classification of insulating materials – electrical, thermal, chemical and mechanical properties of solid insulating materials-Asbestos, Bakelite, rubber, plastics, thermoplastics. Resins, polystyrene, PVC, porcelain, glass, cotton and paper.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand about various characteristics of solid insulating materials **L1**
- Understand the classification of solid insulating materials. **L2**

UNIT – IV: Liquid & Gas Insulating Materials **10 Hrs**

Liquid insulating materials – Mineral oils, synthetic liquids, fluorinated liquids–Electrical, thermal and chemical properties – transformer oil – properties – effect of moisture on insulation properties Gaseous insulators– classification based on dielectric strength – dielectric loss, chemical stability properties and their applications.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand the classification of liquid insulating materials. **L1**
- Analyze the properties of liquid insulating materials **L2**

UNIT – V: Domestic Wiring **10 Hrs**

Wiring materials and accessories–Types of wiring–Types of Switches-Specification of Wiring–Staircase wiring- Fluorescent lamp wiring-God own wiring–Basics of earthling–single phase wiring layout for residential building.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand about wiring materials and accessories **L1**
- Understand about earthing and wiring layout of domestic buildings **L2**

Text Books:

1. Electrical Engineering Materials by G.K. Mithal, Khanna publishers, 2nd edition,1991.
2. Acourse in Electrical Engineering Materials by R.K. Rajput, Laxmi publications,2009.

Reference Books:

1. An Introduction to Electrical Engineering Materials by C.S.Indulkar and S.Thiruvengadam, SChand&Company,2008.
2. Electrical engineering Materials by Technical Teachers Training Institute, Madras, McGraw Hill Education,1st Edition,2004.
3. A course in Electrical Engineering Materials Physics Properties & Applications by S P.Seth, Dhanapat Rai & Sons Publications,2018.

Course Outcomes:

At the end of this Course the student will be able to

- Understand the classification of materials, domestic wiring materials and earthing. **L1**
- Analyze the properties of different electrical materials **L2**
- Apply where the materials are applicable based on properties of materials **L3**
- Design and develop Residential wiring, go down wiring and earthing. **L4**
- `Understand the characteristics of materials **L5**

B.Tech IV Year I Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

19AEE75b- DIGITAL SIGNAL PROCESSORS AND APPLICATIONS

(Open Elective-III)

L	T	P	C
3	0	0	3

Course Objectives: The objectives of the course are to make the students learn about

- Provide the basic knowledge of different DSP Processors.
- Interfacing Memory and I/O Peripherals to different Programmable DSP Devices
- Operation of the ADC and programming modes
- Introduction to Field Programmable Gate Arrays
- Provide the basic knowledge of different DSP Processors.

UNIT – I: **10 Hrs**

Introduction to the TMSLF2407 DSP Controller: Brief Introduction to Peripherals - Types of Physical Memory - Software Tools

C2XX DSP CPU and instruction set: Introduction to the C2xx DSP Core and Code Generation - The Components of the C2xx DSP Core - Mapping External Devices to the C2xx Core and the Peripheral Interface -System Configuration Registers –Memory - Memory Addressing Modes - Assembly Programming Using the C2xx DSP Instruction Set

Learning Outcomes:

At the end of this unit, the student will be able to

- Able to understand the basic concepts of DSP controller **L1**
- Able to understand the Assembly language programming **L2**

UNIT – II: **10 Hrs**

Parallel and Serial Data Transfer: Pin Multiplexing (MUX) and General Purpose I/O Overview - Multiplexing and General Purpose I/O Control Registers - Using the General Purpose I/O Ports, Serial Communication

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand the Pin Multiplexing and GPIO pins **L1**
- Analyze the serial Communication concepts **L2**
- Understand the concept of control Registers **L3**

UNIT – III: **10 Hrs**

Interrupt system of TMS320LF2407: Introduction to Interrupts - Interrupt Hierarchy - Interrupt Control Registers - Initializing and Servicing Interrupts in Software, real time control with interrupts

The analog-to-digital converter (ADC): ADC Overview - Operation of the ADC and programming modes

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand the concept of Interrupts **L1**
- Analyze the concept of Analog to digital converter **L2**

UNIT – IV: **10 Hrs**

Event Managers (EVA, EVB): Overview of the Event Manager (EV) - Event Manager Interrupts - General Purpose (GP) Timers- Compare Units - Capture Units and Quadrature Encoded Pulse (QEP) Circuitry - General Event Manager Information – PWM Signal Generation with Event Managers and interrupts, Measurement of speed with Capture Units, Implementation of Space Vector Modulation with DSP TMSLF2407A

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand the concept of Event Manager and Interrupts **L1**
- Apply the concept of Space Vector Modulation with processor **L2**

UNIT – V: **10 Hrs**

Field Programmable Gate Arrays: Introduction to Field Programmable Gate Arrays – CPLD Vs FPGA – Types of FPGA , Configurable logic Blocks (CLB), Input/Output Block (IOB) – Programmable Interconnect Point (PIP)- HDL programming –overview of Spartan 6 & ISE Design Suite, Implementation of PWM technique with SPARTAN-6 FPGA

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand the concept of Field Programmable Gate Arrays. **L1**
- Apply the concept of HDL programming and PWM technique implementation **L2**

Text Books:

1. Hamid A. Tolyat, "DSP based Electromechanical Motion Control"-CRC press, 2004
2. Wayne Wolf,,,FPGA based system design", Prentice hall, 2004

Reference Books:

1. Application Notes from the website of Texas Instruments
2. Spartan-6 FPGA Configurable Logic Block, 2010
3. Xilinx Spartan 6 Data sheets

Course Outcomes:

At the end of this Course the student will be able to

- Write Assembly Language Programs for the Digital Signal Processors **L1**
- Configure and use Digital Input / Output lines and ADCs **L2**
- Configure and use Interrupts and Event Managers for PWM generation **L3**
- Employ DSPs & **L4**
- FPGAs for the real time control of Power Electronic Controllers **L5**

B.Tech IV Year I Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

19AEE75c- IOT APPLICATIONS IN ELECTRICAL ENGINEERING

(Open Elective-III)

L	T	P	C
3	0	0	3

Course Objectives: The objectives of the course are to make the students learn about

- To learn about a few applications of Internet of Things
- To distinguish between motion less and motion detectors as IOT applications
- To know about Micro Electro Mechanical Systems (MEMS) fundamentals in design and fabrication process
- To understand about applications of IOT in smart grid
- To introduce the new concept of Internet of Energy for various applications

UNIT – I: SENSORS **10 Hrs**

Definitions, Terminology, Classification, Temperature sensors, Thermoresistive, Resistance, temperature detectors, Silicon resistive thermistors, Semiconductor, Piezoelectric, Humidity and moisture sensors. Capacitive, Electrical conductivity, Thermal conductivity, time domain reflectometer, Pressure and Force sensors: Piezoresistive, Capacitive, force, strain and tactile sensors, Strain gauge, Piezoelectric

Learning Outcomes:

At the end of this unit, the student will be able to

- To know about basic principles of sensors and their classification **L1**
- To learn about various motion less sensors **L2**

UNIT – II: Occupancy and Motion detectors **10 Hrs**

Capacitive occupancy, Inductive and magnetic, potentiometric - Position, displacement and level sensors, Potentiometric, Capacitive, Inductive, magnetic velocity and acceleration sensors, capacitive, Piezoresistive, piezoelectric cables, Flow sensors, Electromagnetic, Acoustic sensors - Resistive microphones, Piezoelectric, Photo resistors

Learning Outcomes:

At the end of this unit, the student will be able to

- To know about Capacitive occupancy **L1**
- To understand about Motion detectors **L2**

UNIT – III: MEMS **10 Hrs**

Basic concepts of MEMS design, Beam/diaphragm mechanics, electrostatic actuation and fabrication, Process design of MEMS based sensors and actuators, Touch sensor, Pressure sensor, RF MEMS switches, Electric and Magnetic field sensors

Learning Outcomes:

At the end of this unit, the student will be able to

- To understand about the basic concept of MEMS **L1**
- To know about electrostatic actuation **L2**

UNIT – IV: IOT FOR SMART GRID **10 Hrs**

Driving factors, Generation level, Transmission level, Distribution level, Applications, Metering and monitoring applications, Standardization and interoperability, Smart home

Learning Outcomes:

At the end of this unit, the student will be able to

- To get exposure fundamental applications of IoT to Smart grid **L1**
- To learn about driving factors of IoT in Generation level **L2**

UNIT – V: IOE - Internet of Energy **10 Hrs**

Concept of Internet of Energy, Evaluation of IoE concept, Vision and motivation of IOE, Architecture, Energy routines, information sensing and processing issues, Energy internet as smart grid.

Learning Outcomes:

At the end of this unit, the student will be able to

- To get exposed the new concept of internet of energy **L1**
- To learn about architecture of IOE **L2**

Text Books:

1. Jon S. Wilson, Sensor Technology Hand book, Newnes Publisher, 2004
2. Tai Ran Hsu, MEMS and Microsystems: Design and manufacture, 1st Edition, Mc Grawhill Education, 2017
3. ErsanKabalci and YasinKabalci, From Smart grid to Internet of Energy, 1st Edition, Academic Press, 2019

Reference Books:

1. Raj Kumar Buyya and Amir VahidDastjerdi, Internet of Things: Principles and Paradigms, Kindle Edition, Morgan Kaufmann Publisher, 2016
2. Yen Kheng Tan and Mark Wong, Energy Harvesting Systems for IoT Applications: Generation, Storage and Power Management, 1st Edition, CRC Press, 2019
3. RMD SundaramShriram, K. Vasudevan and Abhishek S. Nagarajan, Internet of Things, Wiley, 2019

Course Outcomes:

At the end of this Course the student will be able to

- To get exposed to recent trends in few applications of IoT in Electrical Engineering **L1**
- To understand about usage of various types of motionless sensors **L2**
- To understand about usage of various types of motion detectors **L3**
- To get exposed to various applications of IoT in smart grid **L4**
- To get exposed to future working environment with Energy internet **L5**

B.Tech IV Year I Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

19AME75a – SPECIAL TYPE OF VEHICLES

(Open Elective-III)

L	T	P	C
2	0	0	2

Course Objectives: The objectives of the course are to make the students learn about

- Introduce the various types of special vehicles.
- Familiarize with the function of graders.
- Identify the applications of haulage vehicles and lift truck
- Understand the functions of scarifiers and scrapers
- Discuss the specifications of special purpose vehicles

UNIT – I: TRACTORS & CRANES AND EXCAVATORS **8 Hrs**

TRACTORS : General description, specification and functions, light, medium and heavy wheeled tractors, crawler tracks mounted / wheeled - Bull dozers, tilt dozers and angle dozers, front end loaders, factors affecting efficiency of output of tractors, simple problems, merits and demerits.

CRANES AND EXCAVATORS: General description, specifications and functions, excavator mounted cranes, mobile cranes with strut and cantilever type jibs, tractor towed and tractor mounted cranes. General description, specification and functions, classification based on attachments, face shovel, drag shovel, hoe, drag-line and grab or clam shell, advantages and limitations.

Learning Outcomes:

At the end of this unit, the student will be able to

- Classify various types of tractors **L1**
- Calculate the efficiency of output of tractors **L4**
- Discuss the functions of cranes and excavators **L2**
- Recall the advantages and limitations of cranes and excavators **L2**

UNIT – II: GRADERS **6Hrs**

Description, specification of tractor towed graders and motor graders, classification and functions of graders, functional details of spreading, mixing, ditching, bank sloping, snow removal, stripping, scarifying, and finishing, elementary details of transmission system (coupling, clutches, gear box, driving axles, propeller shafts), running gear and operating equipment air braking system; hydraulic system and its components, steering system of lights, medium and heavy graders, merits and limitations of graders.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand the terms spreading, mixing, ditching, back sloping, scarifying. **L2**
- Discuss elementary details of transmission system **L2**
- Demonstrate the hydraulic system and its components. **L3**
- List the merits and limitations of graders. **L2**

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UNIT – III: HAULAGE VEHICLES AND LIFT TRUCKS **6Hrs**

General description, specification and functions, self-propelled and tractor towed haulage vehicles and pneumatic – tires, dumpers – front tipping; trucks – rear tipping, tractor towed semi-trailers and trailers (rear and side tipping, bottom dumping). General description, specification and functions, fork lift trucks, alternative front end equipment (attachments) – Jib arm, shovel bucket, squeeze clamp, boom, fork extensions, barrel forks. Scissors lift trucks - Applications in industry, advantages and disadvantages.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand the importance of haulage vehicles and trucks in industries. **L2**
- Select haulage vehicles for a given application **L6**
- Illustrate the function of fork lift trucks. **L3**

UNIT – IV: Rooters, Scarifiers And Scrapers **6 Hrs**

General description, specification and functions, tractor towed rooters and scarifiers - Heavy duty, light duty. General description, specification and functions, tractor towed and motorized scrapers, scraper work in cutting, cambering, side hill cutting, spreading on embankments, compaction of fill merits and demerits.

Learning Outcomes:

At the end of this unit, the student will be able to

- Describe the specifications of rooters **L2**
- Categorize Heavy duty and light duty scarifiers **L4**
- Recall the merits and demerits of scrapers. **L1**

UNIT – V: Compaction Vehicles And Other Special Purpose Vehicles **6Hrs**

General description, specification and functions, smooth wheeled rollers, pneumatic tired rollers, agricultural Rollers, sheep's foot rollers, vibrating compactors. General description, specification and functions, Ambulance, oil tankers, surveillance vehicle, television recording mobile UNIT, reefer vehicle, double decker bus, vestibule bus, fire fighting vehicle.

Learning Outcomes:

At the end of this unit, the student will be able to

- List various types of special purpose vehicles. **L1**
- Choose the rollers for a given application. **L1**
- Discuss the function of compactors. **L2**
- Explain the importance of special purpose vehicles in the society. **L2**

Text Books:

1. Peurifoy R L "Construction Planning, Equipment and Methods", Tata McGraw-Hill, NewDelhi, 2002.
2. Ian Graham, "Off-Road vehicles", Heinemann Library, 2008.

Reference Books:

1. Wong J "Terramechanics and Off-Road Vehicle Engineering", Butterworth-Heinemann, 2009.
2. Roninson E G, "Motor Graders", MIR Publications, Moscow, 1985.
3. Rodhiev and Rodhiev, "Tractors and Automobiles", MIR Publishers, Moscow, 1984.
4. Greenwich and Soreking, "Tractors", MIR Publishers, Moscow, 1967.

Course Outcomes:

At the end of this Course the student will be able to

- Classify excavators based on attachments. **L2**
- Understand the importance of graders. **L2**
- Identify the various types of fork lift attachments. **L2**
- Recall the advantages and disadvantages of special purpose vehicles. **L1**

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B.Tech IV Year I Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

19AME75b - SIX SIGMA AND LEAN MANUFACTURING

(Open Elective-III)

L	T	P	C
2	0	0	2

Course Objectives: The objectives of the course are to make the students learn about

- Introduce the students, the basic concepts of six sigma and lean manufacturing.
- Expose with various quality issues in Inspection.
- Gain Knowledge on quality control and its applications to real time.
- Know the extent of cellular manufacturing and 5S.
- Understand the importance of Quality standards in manufacturing.

UNIT – 1: Introduction to Six-Sigma **8 Hrs**

Probabilistic models-Six Sigma measures-Yield-DPMO-Quality level-Reliability function using Six-Sigma-MTTF using Six Sigma-Maintenance free operating period- Availability using Six-Sigma-Point availability-Achieved availability-Operational Availability-Examples.

Learning Outcomes:

At the end of this unit, the student will be able to

- Explain the concepts of probabilistic models **L2**
- Determine the reliability function using six-sigma **L3**
- Explain about MTTF using six sigma concepts **L2**
- Illustrate the examples of availability using sigma **L2**

UNIT – II: The Elements of Six Sigma and their Determination **6Hrs**

The Quality Measurement Techniques: SQC, Six Sigma, Cp and Cpk- The Statistical quality control (SQC) methods-The relationship of control charts and six sigma-The process capability index (Cp)-Six sigma approach-Six sigma and the 1.5 σ shift-The Cpk Approach Versus Six Sigma-Cpk and process average shift- Negative Cpk-Choosing six sigma or Cpk-Setting the process capability index-Examples.

Learning Outcomes:

At the end of this unit, the student will be able to

- List the quality measurement techniques **L1**
- Discuss the process capability index (Cp).
- Compare the Cpk Approach and Six Sigma
- Explain about different statistical quality control methods
- State the relationship of control charts and six sigma **L2**

UNIT – III: Introduction To Lean Manufacturing **6Hrs**

Conventional Manufacturing versus Lean Manufacturing – Principles of Lean Manufacturing – Basic elements of lean manufacturing – Introduction to LM Tools.

Learning Outcomes:

At the end of this unit, the student will be able to

- Illustrate the basic elements of lean manufacturing **L2**
- List the various lean manufacturing tools. **L1**
- Describe the principles of lean manufacturing **L2**
- Compare conventional manufacturing and lean manufacturing system **L2**

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UNIT – IV: Cellular Manufacturing, JIT, TPM **6 Hrs**

Cellular Manufacturing – Types of Layout, Principles of Cell layout, Implementation. JIT – Principles of JIT and Implementation of Kanban. TPM – Pillars of TPM, Principles and implementation of TPM.

Learning Outcomes:

At the end of this unit, the student will be able to

- Explain the concept of cellular manufacturing **L2**
- Indentify the types of layouts. **L3**
- Describe the concepts of JIT and TPM **L2**
- Demonstrate the pillars of TPM **L2**
- Create the cell layout. **L6**

UNIT – V: Set Up Time Reduction, TQM, 5S, VSM 10 **6Hrs**

Set up time reduction – Definition, philosophies and reduction approaches. TQM – Principles and implementation. 5S Principles and implementation - Value stream mapping - Procedure and principles.

Learning Outcomes:

At the end of this unit, the student will be able to

- Define set up time reduction. **L1**
- Illustrate the principles and implementation of 5S techniques. **L2**
- Discuss procedure and principles of value stream mapping **L6**
- List the various reduction approaches **L1**

Text Books:

1. U Dinesh Kumar, Crocker, Chitra and Harithe Saranga, Reliability and Six Sigma, Springer Publishers.
2. Sung H. Park, Six Sigma for Quality and Productivity Promotion, Asian Productivity Organization

Reference Books:

1. Sammy G. Shina, Six Sigma for Electronics Design and Manufacturing, McGraw-Hill.
2. Design and Analysis of Lean Production Systems, Ronald G. Askin & Jeffrey B. Goldberg, John Wiley & Sons, 2003.
3. Mikell P. Groover (2002) _Automation, Production Systems and CIM.
4. Rother M. and Shook J, 1999 _Learning to See: Value Stream Mapping to Add Value and Eliminate Muda' , Lean Enterprise Institute, Brookline, MA.

Course Outcomes:

At the end of this Course the student will be able to

- Summarize various techniques that are related to the six-sigma and lean manufacturing **L2**
- Outline the concepts of cellular manufacturing, JIT and TPM **L2**
- Illustrate the principles and implementation of 5S techniques **L2**
- Discuss procedure and principles of value stream mapping **L6**
- Determine the reliability function using six-sigma. **L3**

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B.Tech IV Year I Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

19AME75c – REVERSE ENGINEERING

(Open Elective-III)

L	T	P	C
2	0	0	2

Course Objectives: The objectives of the course are to make the students learn about

- Introduce the concepts of reverse engineering
- Familiarize with the tools and techniques for reverse engineering
- Teach the principles of various rapid prototyping methods
- Discuss the legal aspects of reverse engineering.

UNIT – 1: Introduction **8 Hrs**

Scope and tasks of RE, Process of duplicating, Definition and use of Reverse Engineering, Reverse Engineering as a Generic Process

Learning Outcomes:

At the end of this unit, the student will be able to

- Recall the definition and use of reverse engineering. **L1**
- Identify reverse engineering as a generic process. **L2**
- List various tasks of reverse engineering. **L1**

UNIT – II: Tools and Techniques for RE **6Hrs**

Object scanning: contact scanners, noncontact scanners, destructive method, coordinate measuring machine, Point Data Processing: pre processing and post processing of captured data, geometric model development, construction of surface model, solid model, noise reduction, feature identification, model verification

Learning Outcomes:

At the end of this unit, the student will be able to

- Summarize various techniques in reverse engineering. **L2**
- Compare preprocessing and post processing of captured data. **L4**
- Explain noise reduction, feature identification and model verification. **L2**

UNIT – III: Rapid Prototyping **6Hrs**

Introduction, current RP techniques and materials, Stereo Lithography, Selective Laser Sintering, Fused Deposition Modelling, Three-dimensional Printing, Laminated Object Manufacturing, Multi – jet Modelling, Laser-engineered Net Shaping, Rapid Prototyping, Rapid Tooling, Rapid Manufacturing

Learning Outcomes:

At the end of this unit, the student will be able to

- Identify the developments in the rapid prototyping techniques **L2**
- Classify rapid prototyping techniques. **L2**
- List the advantages and disadvantages of rapid prototyping methods. **L1**

UNIT – IV: Integration **6 Hrs**

Cognitive approach to RE, Integration of formal and structured methods in reverse engineering, Integration of reverse engineering and reuse.

Learning Outcomes:

At the end of this unit, the student will be able to

- Explain the cognitive approach to reverse engineering. **L2**
- Discuss the integration of formal and structured methods in reverse engineering. **L2**

UNIT – V: Legal Aspects of Reverse Engineering **6Hrs**

Legal Aspects of Reverse Engineering: Introduction, Copyright Law.

Learning Outcomes:

At the end of this unit, the student will be able to

- Identify the legal aspects of reverse engineering **L2**
- Understand the concepts of copyright law. **L2**

Text Books:

1. Biggerstaff T. J., "Design Recovery for Maintenance and Reuse", IEEE Corporation, 1991.
2. Katheryn, A. Ingle, "Reverse Engineering", McGraw-Hill, 1994.

Reference Books:

1. Aiken Peter, "Data Reverse Engineering", McGraw-Hill, 1996.
2. Linda Wills,"Reverse Engineering" ,Kluiver Academic Publishers, 1996.
3. Donald R. Honsa , "Co-ordinate Measurement and reverse engineering", American Gear Manufacturers Association, 1996.

Course Outcomes:

At the end of this Course the student will be able to

- Understand the importance of reverse engineering. **L2**
- Make use of tools and techniques of reverse engineering. **L3**
- Identify the applications of rapid prototyping techniques. **L2**

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B.Tech IV Year I Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

19AME75d – ENERGY AUDITING

(Open Elective-III)

L	T	P	C
2	0	0	2

Course Objectives: The objectives of the course are to make the students learn about

- Introduce the concepts of energy scenario and need for energy policy for industries in India.
- Familiarize with the Energy Audit concepts and its approaches.
- Teach the principles and objectives of the Energy management.

UNIT – I: General Aspects **8 Hrs**

Review of energy scenario in India, General Philosophy and need of Energy Audit and Management, Basic elements and measurements - Mass and energy balances – Scope of energy auditing industries - Evaluation of energy conserving opportunities, Energy performance contracts, Fuel and Energy substitution, Need for Energy Policy for Industries, National & State level energy Policies.

Learning Outcomes:

At the end of this unit, the student will be able to

- Explain the fundamental aspects of energy scenario in India. **L2**
- List the various national and state level energy policy. **L1**
- Identify the basic elements and measurements of energy audit. **L3**
- Summarize the evaluation of energy conserving balances **L2**

UNIT – II: Energy Audit Concepts **6Hrs**

Need of Energy audit - Types of energy audit – Energy management (audit) approach - understanding energy costs - Bench marking – Energy performance - Matching energy use to requirement - Maximizing system efficiencies -Optimizing the input energy requirements - Duties and responsibilities of energy auditors- Energy audit instruments - Procedures and Techniques.

Learning Outcomes:

At the end of this unit, the student will be able to

- Summarize various concepts of energy audit. **L2**
- Compare various energy management approaches. **L4**
- Explain Bench marking and energy performance in energy auditing. **L2**

UNIT – III: Principles and Objectives of Energy Management **6Hrs**

Design of Energy Management Programmes - Development of energy management systems – Importance - Indian need of Energy Management - Duties of Energy Manager - Preparation and presentation of energy audit reports - Monitoring and targeting, some case study and potential energy savings.

Learning Outcomes:

At the end of this unit, the student will be able to

- Identify the developments of energy management systems **L2**
- Explain the importance of energy management **L2**
- List the various duties of energy manager **L1**

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UNIT – IV: Thermal Energy Management **6 Hrs**

Energy conservation in boilers - steam turbines and industrial heating systems - Application of FBC - Cogeneration and waste heat recovery -Thermal insulation - Heat exchangers and heat pumps – HVC industries-Building Energy Management.

Learning Outcomes:

At the end of this unit, the student will be able to

- Explain the concepts of energy conservation in boilers **L2**
- Identify the thermal energy components **L3**
- Illustrate the applications of FBC boilers **L2**

UNIT – V: Electrical Energy Management **6Hrs**

Supply side Methods to minimize supply-demand gap- Renovation and modernization of power plants - Reactive power management – HVDC- FACTS - Demand side - Conservation in motors - Pumps and fan systems – Energy efficient motors.

Learning Outcomes:

At the end of this unit, the student will be able to

- Explain the concepts of supply side methods to minimize supply. **L2**
- Explain the reactive power management. **L2**
- Identify the energy conservation methods in motors, pumps and fan systems. **L3**
- List the energy efficient motors. **L2**

Text Books:

1. Murphy, W. R., Energy Management, Elsevier, 2007.
2. Smith, C. B., Energy Management Principles, Pergamum, 2007
3. Handbook of Energy Audit, Sonal Desai, Mcgraw Hill Education Private Ltd.,

Reference Books:

1. Turner, W. C., Doty, S. and Truner, W. C., Energy Management Hand book, 7th edition, Fairmont Press, 2009.
2. De, B. K., Energy Management audit & Conservation, 2nd Edition, Vrinda Publication, 2010.
3. Energy Management Handbook – W.C. Turner (John Wiley and Sons, A Wiley a. Interscience publication)
4. Industrial Energy Management and Utilisation –L.C. Witte, P.S. Schmidt, D.R. Brown (Hemisphere Publication, Washington, 1988)
5. Industrial Energy Conservation Manuals, MIT Press, Mass, 1982
6. Energy Conservation guide book Patrick/Patrick/Fardo (Prentice hall1993)

Course Outcomes:

At the end of this Course the student will be able to

- Understand the basic concepts of energy audit and energy management **L2**
- Explain different types of energy audit, maximizing and optimizing system efficiency. **L3**
- Summarize energy management systems, prepare and present energy audit report **L5**
- Identify energy saving potential of thermal and electrical systems **L3**
- Discuss Energy audit instruments, Procedures and Techniques. **L2**

B.Tech IV Year I Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

19AME75e – INTRODUCTION TO COMPOSITE MATERIALS

(Open Elective-III)

L	T	P	C
2	0	0	2

Course Objectives: The objectives of the course are to make the students learn about
- Introduce composite materials and their applications.
- Build proper background for stress analysis in the design of composite structures.
- Familiarize various properties of composite materials.
- Focus on biodegradable composites.

UNIT – I: Introduction to composites **8 Hrs**

Fundamentals of composites – Definition – classification– based on Matrix – based on structure – Advantages and applications of composites - Reinforcement – whiskers – glass fiber – carbon fiber - Aramid fiber – ceramic fiber – Properties and applications.

Learning Outcomes:

At the end of this unit, the student will be able to
- Explain the fundamentals of composites. **L2**
- Classify the composites based on matrix and structure. **L2**
- Identify the practical applications of composites. **L3**
- Summarize the properties and advantages of reinforcement materials **L2**

UNIT – II: Polymer matrix composites **6Hrs**

Polymers - Polymer matrix materials – PMC processes - hand layup process – spray up process – resin transfer moulding – Pultrusion – Filament winding – Auto clave based methods - Injection moulding – sheet moulding compound – properties and applications of PMC's.

Learning Outcomes:

At the end of this unit, the student will be able to
- Explain the properties of polymer matrix composites. **L2**
- Identify the polymer matrix composites. **L3**
- Explain various process used in making the polymer matrix composites **L2**
- Discuss the auto clave based methods. **L6**

UNIT – III: Metal matrix composites **6Hrs**

Metals - types of metal matrix composites – Metallic Matrices. Processing of MMC – Liquid state processes – solid state processes – In-situ processes. Properties and applications of MMC's.

Learning Outcomes:

At the end of this unit, the student will be able to
- Outline the various types of metal matrix composite **L2**
- Explain liquid state processes and solid state processes in MMCs preparation **L2**
- Demonstrate In-situ processes **L2**
- Identify the properties and applications of MMCs **L2**

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UNIT – IV: Ceramic matrix composites **6 Hrs**

Ceramic matrix materials – properties – processing of CMCs – Sintering - Hot pressing – Infiltration – Lanxide process – In-situ chemical reaction techniques – sol-gel polymer pyrolsis –SHS - Cold isostatic pressing (CIPing) – Hot isostatic pressing (HIPing). Properties and Applications of CCMs.

Learning Outcomes:

At the end of this unit, the student will be able to

- Summarize the various types of ceramic matrix materials. **L2**
- Explain the sintering, hot pressing, infiltration and lanxide process **L2**
- Contrast between cold and hot isostatic pressing. **L2**
- Examine the properties and applications of CCMs. **L3**

UNIT – V: Advances in composites **6Hrs**

Advantages of carbon matrix – limitations of carbon matrix carbon fibre – chemical vapour deposition of carbon on carbon fibre perform. Properties and applications of Carbon-carbon composites. Composites for aerospace applications.

Characterization of composite materials - Mechanical Properties, Thermal Properties.

Learning Outcomes:

At the end of this unit, the student will be able to

- Explain the advantages and disadvantages of carbon matrix **L2**
- Identify composites for aerospace applications **L3**
- Apply chemical vapour deposition of carbon on carbon fibre perform **L3**
- Select the carbon - carbon composites. **L1**
- Classify various bio- degradable composites **L3**

Text Books:

1. Chawla K.K, Composite materials, 2/e, Springer – Verlag, 1998.
2. Mathews F.L. and Rawlings R.D., Chapman and Hall, Composite Materials: Engineering and Science, 1/e, England, 1994.

Reference Books:

1. H K Shivanand, B V Babu Kiran, Composite Materials, ASIAN BOOKS, 2011.
2. A.B. Strong, Fundamentals of Composite Manufacturing, SME, 1989.
3. S.C. Sharma, Composite materials, Narosa Publications, 2000.
4. Maureen Mitton, Hand Book of Bioplastics & Bio-composites for Engineering applications, John Wiley publications.

Course Outcomes:

At the end of this Course the student will be able to

- Identify the practical applications of composites. **L3**
- Identify the polymer matrix composites. **L3**
- Classify of bio- degradable composites. **L2**
- Outline the various types of ceramic matrix materials. **L2**

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B.Tech IV Year I Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

19AME75f – CUSTOMER RELATIONSHIP MANAGEMENT

(Open Elective-III)

L	T	P	C
2	0	0	2

Course Objectives: The objectives of the course are to make the students learn about

- Introduce basic concepts and principles of customer relationship management (CRM).
- Familiarize with appreciate the role and changing face of CRM as an IT enabled function.
- Describe concept of managing and sharing customer data.
- Explain the principles of CRM links in e-Business.
- Expose the students on Enterprise resource planning (ERP),supply chain management (SCM) and Supplier relationship management (SRM).

UNIT – 1: CRM concepts **8 Hrs**

CRM concepts - Acquiring customers, - Customer loyalty and optimizing customer relationships - CRM defined - success factors, the three levels of Service/ Sales Profiling - Service Level Agreements (SLAs), creating and managing effective SLAs.

Learning Outcomes:

At the end of this unit, the student will be able to

- Explain the concepts of customer relationship management **L2**
- Define customer relationship management (CRM) **L1**
- Illustrate the service level agreements (SLAs) **L2**

UNIT – II: CRM in Marketing **6Hrs**

CRM in Marketing - One-to-one Relationship Marketing - Cross Selling & Up Selling - Customer Retention, Behaviour Prediction - Customer Profitability & Value Modeling, - Channel Optimization - Event-based marketing. - CRM and Customer Service - The Call Centre, Call Scripting - Customer Satisfaction Measurement.

Learning Outcomes:

At the end of this unit, the student will be able to

- Explain the concept of one-to-one relationship marketing **L2**
- Develop the skills related to predict the behaviour and retention of the customer **L6**
- Discus about customer profitability and value modeling. **L6**
- Illustrate the various methods for CRM and customer service **L2**

UNIT – III: Sales Force Automation **6Hrs**

Sales Force Automation - Sales Process, Activity, Contact- Lead and Knowledge Management - Field Force Automation. - CRM links in e-Business - E-Commerce and Customer Relationships on the Internet - Enterprise Resource Planning (ERP), - Supply Chain Management (SCM), - Supplier Relationship Management (SRM), - Partner relationship Management (PRM).

Learning Outcomes:

At the end of this unit, the student will be able to

- Explain the concept of CRM links in e-Business. **L2**
- Discus E-commerce and customer relationship on the internet. **L6**
- Describe Enterprise resource planning (ERP), Supply chain management (SCM). **L2**
- Explain terms supplier relationship management and partner relationship management. **L2**

UNIT – IV: Analytical CRM **6 Hrs**

Analytical CRM - Managing and sharing customer data - Customer information databases - Ethics and legalities of data use - Data Warehousing and Data Mining concepts - Data analysis - Market Basket Analysis (MBA), Click stream Analysis, Personalization and Collaborative Filtering.

Learning Outcomes:

At the end of this unit, the student will be able to

- Explain how to manage and sharing the customer data **L2**
- List the various ethics and legalities of customer database use **L1**
- Describe various data warehousing and data mining concepts **L3**
- Discus about market basket analysis (MBA) **L6**

UNIT – V: CRM Implementation **6Hrs**

CRM Implementation - Defining success factors - Preparing a business plan requirements, justification and processes. - Choosing CRM tools - Defining functionalities - Homegrown versus out-sourced approaches - Managing customer relationships - conflict, complacency, Resetting the CRM strategy. Selling CRM internally - CRM development Team - Scoping and prioritizing - Development and delivery - Measurement.

Learning Outcomes:

At the end of this unit, the student will be able to

- Define success factors for implementing the customer relationship management. **L1**
- Define functionalities of CRM. **L1**
- Explain the functions of CRM development team. **L2**
- Compare Home grown and out-sourced approaches. **L2**

Text Books:

1. Alok Kumar Rai, Customer Relationship Management Concept & Cases, Prentice Hall Of India Private Limted, New Delhi. 2011.
2. S. Shanmugasundaram, Customer Rela Tionship Management, Prentice Hall Of India Private Limted, New Delhi, 2008.

Reference Books:

1. Kaushik Mukherjee, Customer Relationship Management, Prentice Hall Of India Private Limted, New Delhi, 2008.
2. Jagdish Seth, Et Al, Customer Rela Tionship Management.
3. V. Kumar & Werner J., Customer Rela Tionship Management, Willey India, 2008.

Course Outcomes:

At the end of this Course the student will be able to

- Summarizes the how CRM works in industries. **L2**
- Discus about market basket analysis (MBA). **L6**
- Develop the skills related to predict the behaviour and retention of the customer. **L6**
- Explain the concepts of customer relationship management. **L2**

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B.Tech IV Year I Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

19AEC75a-EMBEDDED SYSTEMS & IOT

(Open Elective-III)

L	T	P	C
2	**0**	**0**	**2**

Course Objectives: The objectives of the course are to make the students learn about

- To understand the basics of Embedded Systems and IOT.
- To learn the architecture and programming of ARM Microcontroller.
- To be able to work with Raspberry Pi using Python Programming.
- To know about the IOT standards, communication technologies and protocols.
- To implement real time projects using the tools and techniques of IOT Platform.

UNIT – I:

Introduction to Embedded Systems and Internet of Things (IOT): Architecture of Embedded Systems, Embedded Systems Development process, Architecture of Internet of Things, Applications of Embedded Systems and IOT, Design Methodology for IOT Products

Learning Outcomes:

At the end of this unit, the student will be able to

- Gain knowledge on basics of embedded systems and IOT Architectures. **L1**
- Understand the design methodology and applications of embedded systems and IOT. **L2**

UNIT – II:

ARM Microcontrollers Architecture and Programming: Architecture, Instruction set, Programming ports, Timer/Counter, Serial communication, interrupts in C, Introduction ARM mBed platform.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand the architecture and programming of ARM Microcontrollers. **L2**
- Work with ARM Microcontrollers in implementing real time projects. **L6**

UNIT – III:

Fundamentals of Python Programming & Raspberry Pi: Introduction to python programming, Working with functions, classes, REST full Web Services, Client Libraries, Introduction & programming Raspberry Pi3, Integrating Input Output devices with Raspberry Pi3.

Learning Outcomes:

At the end of this unit, the student will be able to

- Write programs using Python to implement the given task. **L6**
- Use Raspberry Pi3 for integrating Input & Output devices. **L3**

UNIT – IV:

IOT Technologies, Standards and Tools: Fundamental characteristics and high level requirements of IOT, IOT Reference models; Introduction to Communication Technologies & Protocols of IOT: BLE, Wi-Fi, LORA, 3G/4G Technologies and HTTP, MQTT, COAP protocols; Relevant Practicals on above technologies.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand the characteristics and high level requirements to design new IoT devices. **L2**
- Summarize different Communication Technologies & Protocols of IoT. **L2**

UNIT – V:

IOT Platform, Cloud Computing Platforms for IoT Development: IOT Platform Architecture (IBM Internet of Things & Watson Platforms); API Endpoints for Platform Services; Devices Creation and Data Transmission; Introduction to NODE-RED and Application deployment.

Learning Outcomes:

At the end of this unit, the student will be able to

- Learn how to use API Endpoints for Platform Services, Devices Creation and Data Transmission. **L1**
- To implement real time projects using the tools and techniques of IoT Platform. **L6**

Text Books:

1. ArsheepBahga, Vijay Madisetti, "Internet of Things: A Hands-On Approach", 1st Edition, VPT, 2014.
2. K.V.K.K.Prasad, "Embedded Real Time Systems: Concepts, Design and Programming", 1st Edition, Dreamtech Publication, 2014.
3. Adrian McEwen, Hakim Cassimally, "Designing the Internet of Things", Wiley Publications, 2013

Reference Books:

1. Jonathan W Valvano, "Embedded Microcomputer Systems: Real-Time Interfacing", 3rd Edition, Thomson Engineering, 2012.
2. Olivier Hersent, David Boswarthick, Omar Elloumi, "The Internet of Things: Key applications and Protocols", 2nd Edition, Wiley Publications, 2012.

Course Outcomes:

At the end of this Course the student will be able to

- Understand the basics of Embedded Systems and IOT. **L2**
- Correlate the architecture and programming of ARM Microcontroller. **L4**
- Work with Raspberry Pi using Python Programming. **L6**
- Summarize IOT standards, communication technologies and protocols. **L2**
- Implement real time projects using the tools and techniques of IOT Platform. **L6**

B.Tech IV Year I Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

19AEC75b-ELECTRONIC INSTRUMENTATION

(Open Elective-III)

L	T	P	C
2	0	0	2

Course Objectives: The objectives of the course are to make the students learn about

- To know about the performance characteristics of instruments and measurement of electrical quantities.
- To understand the construction, working and applications of different types of CRO"s.
- To analyze the working of different types of bridges.
- To study the working of signal & function generators.
- To analyze the working of transducers in measuring physical parameters

UNIT – I:

Measuring Instruments: Introduction, Errors in Measurement, Accuracy, Precision, Resolution and Significant figures. Basic PMMC Meter- construction and working, DC and AC Voltmeters-Multirange, Range extension, DC Ammeter, Multimeter for Voltage, Current and resistance measurements.

Digital Instruments: Digital Voltmeters – Introduction, DVM's based on V–T, V–F and Successive approximation principles, Resolution and sensitivity, General specifications, Digital Multimeters, Digital frequency meters, Digital measurement of time.

Learning Outcomes:

At the end of this unit, the student will be able to

- Learn about the performance characteristics of the instruments. **L1**
- Understand the working of different types of ammeters, voltmeters and multimeters. **L2**

UNIT – II:

Oscilloscopes: Introduction, Block diagram of CRO, Basic principle of CRT, CRT Construction and features, vertical amplifiers, horizontal dPeflection system- sweep, trigger pulse, delay line, sync selector circuits. Dual beam and dual trace CROs, Sampling and Digital storage oscilloscopes.

Learning Outcomes:

At the end of this unit, the student will be able to

- Grasp the construction and working of different types of oscilloscopes. **L1**
- Use CRO to measure the amplitude, frequency, phase and time period of given signals. **L3**

UNIT – III:

Bridges: DC Bridges for Measurement of resistance - Wheat stone bridge, Kelvin's Bridge, AC Bridges for Measurement of inductance- Maxwell's bridge, Hay's Bridge, Anderson bridge, Measurement of capacitance - Schearing Bridge, Wien Bridge, Errors and precautions in using bridges.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand the construction and working of different types of bridges. **L2**
- Measure parameters like resistance, capacitance, and inductance using bridges. **L3**

UNIT – IV:

Signal Generators: Introduction, Fixed and variable AF oscillator, Standard signal generator, Laboratory type signal generator, AF sine and Square wave generator, Function generator, Square and Pulse generator, Sweep frequency generator.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand the working and applications of signal generators. **L2**
- Gain knowledge on the working and applications of function generators. **L1**

UNIT – V:

Transducers: Introduction, Types of Transducers, Electrical transducers, Selecting a transducer, Resistive transducer, Strain gauges, Piezoelectric transducer, Photoelectric transducer, Photovoltaic transducer, Temperature transducers-RTD, LVDT.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand the basic working principle and applications of transducers. **L2**
- Measure physical parameters using different types transducers. **L3**

Text Books:

1. H.S.Kalsi, "Electronic Instrumentation", Third edition, Tata McGraw Hill, 2010.
2. A.D. Helfrick and W.D. Cooper, "Modern Electronic Instrumentation and Measurement Techniques", PHI, 6th Edition, 2010.

Reference Books:

1. A.K. Sawhney, Dhanpat Rai & Co., "A course in Electrical and Electronic Measurements and Instrumentation", 9th Edition, 2010.
2. David A. Bell, "Electronic Instrumentation & Measurements", PHI, 2nd Edition, 2006.

Course Outcomes:

At the end of this Course the student will be able to

- Know about the performance characteristics of instruments and measurement of electrical quantities. **L1**
- Understand the construction, working and applications of different types of CRO"s. **L2**
- Compare the working of different types of bridges. **L2**
- Learn the working of signal & function generators. **L1**
- Analyze the working of transducers in measuring physical parameters. **L4**

B.Tech IV Year I Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

19AEC75c-BASICS OF VLSI DESIGN

(Open Elective-III)

L	T	P	C
3	0	0	3

Course Objectives: The objectives of the course are to make the students learn about

- To give exposure to different steps involved in the fabrication of ICs and electrical properties of MOS devices.
- To know the design rules in drawing the layout of any logic circuit.
- To design different types of logic gates using CMOS inverter and analyze their transfer characteristics.
- To learn the concepts scaling and designing building blocks of data path of any system using gates.
- Understand the design and operation of basic programmable logic devices.

UNIT – I:

MOS Technology: Introduction to IC Technology. The IC Era, MOS and related VLSI Technology, Basic MOS Transistors, Enhancement and Depletion modes of transistor action, nMOS and CMOS Fabrication processes.

Basic Electrical Properties of MOS Circuits: I_{ds} versus V_{ds} Relationships, Aspects of MOS transistor Threshold Voltage, MOS transistor Transconductance and Output Conductance, nMOS Inverter, Determination of Pull-up to Pull-down Ratio for nMOS inverter driven by another nMOS inverter, CMOS Inverter.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand different steps involved in the fabrication of ICs and electrical properties of MOS devices. **L2**
- Analyze the operation of NMOS, CMOS and BiCMOS inverters. **L4**

UNIT – II:

MOS Circuit Design Processes: MOS Layers, Stick Diagrams, Design Rules and Layout, General observations on the Design rules, 2μm Double Metal, Double Poly CMOS rules, Layout Diagrams-A Brief Introduction, Symbolic Diagrams-Translation to Mask Form.

Learning Outcomes:

At the end of this unit, the student will be able to

- Know the VLSI design flow and stick diagrams. **L1**
- Understand the design rules in drawing the layout of any logic circuit. **L2**

UNIT – III:

Basic Circuit Concepts: Sheet Resistance. Sheet Resistance concept applied to MOS transistors and Inverters, Area Capacitance of Layers, standard unit of capacitance, area Capacitance calculations, the Delay Unit, Inverter Delays, Driving large capacitive loads, Propagation Delays, Wiring Capacitances.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand different types of logics in gate level design. **L2**
- Learn and compare different performance parameters in gate level design. **L1**

UNIT – IV:

Scaling of MOS Circuits: Scaling models and scaling factors, Scaling factors for device parameters, Limitations of scaling.

Sub System Design and Layout: Switch logic, Gate logic, Examples of Structured Design, parity generator, multiplexers, and grey to binary code converter.

Learning Outcomes:

At the end of this unit, the student will be able to

- Appreciate the importance, models and limitations of scaling. **L1**
- Explain the building blocks of data path of any system using gates. **L1**

UNIT – V:

Programmable Logic Devices: Read only memories, Programmable Logic Arrays (PLA), Programmable Array Logic (PAL), Complex programmable logic devices, Field programmable gate arrays.

Learning Outcomes:

At the end of this unit, the student will be able to

- Explain different programmable logic devices. **L1**
- Compare the performance parameters and applications of different programmable logic devices. **L2**

Text Books:

1. Kamran Eshraghian. Douglas, A. Pucknell and Sholeh Eshraghian, "Essentials of LSI Circuits and Systems", Prentice Hall of India Private Limited, 2005 Edition.
2. Neil H.E.WESTE, David Harris andAyan Banerjee, "CMOS VLSI Design A Circuits and systems perspective", Pearson Education, 2006 Third Edition

Reference Books:

1. Richa Jain and Amrita Rai, "Principles of VLSI and CMOS Integrated Circuits", S.Chand and Company Limited. First edition.2012.
2. Wayne Wolf, "Modern VLSI Design", Pearson Education, 3rd Edition.

Course Outcomes:

At the end of this Course the student will be able to

- Understand different steps involved in the fabrication of ICs and electrical properties of MOS devices. **L2**
- Know the design rules in drawing the layout of any logic circuit. **L1**
- Compare different types of logic gates using CMOS inverter and their transfer characteristics. **L2**
- Learn the concepts to design building blocks of data path of any system using gates. **L1**
- Gain knowledge about basic programmable logic devices and testing of CMOS circuits. **L1**

IV B.Tech I SEMESTER

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

19ACS75a-MOBILE APPLICATION DEVELOPMENT

Open Elective-III

L	T	P	C
2	0	0	2

Course Objectives:

- Android Application Development course is designed to quickly get you up to speed with writing apps for Android devices. The student will learn the basics of Android platform and get to understand the application lifecycle

UNIT – 1: **8 Hrs**

Introduction Android Programming: What is Android, Activities, Linking Activities Using Intents, Fragments, Calling Built – in Applications using Intents, Displaying Notifications.

Learning Outcomes:

At the end of this unit, the student will be able to

- demonstrate their understanding of the fundamentals of Android operating systems **L2**
- demonstrate their skills of using Android software development tools **L2**

UNIT – II: **8 Hrs**

Android User Interface: Understanding the Components of a Screen, Adapting to Display Orientation, Managing Changes to Screen Orientation, Utilizing the Action Bar, Listening for UI Notifications.

Learning Outcomes:

At the end of this unit, the student will be able to

- demonstrate their ability to develop software with reasonable complexity on mobile platform. **L3**
- demonstrate their ability to deploy software to mobile devices **L3**

UNIT – III: **8 Hrs**

Designing User Interface with Views: Basic Views, Picker Views, Using List Views to Display Long Lists.

Learning Outcomes:

At the end of this unit, the student will be able to

- demonstrate their ability to debug programs running on mobile devices **L4**
- demonstrate their ability to deploy software to mobile devices **L4**

UNIT – IV: **7 Hrs**

Displaying pictures and menus with views and Data Persistence: Views to Display pictures, menus with views, additional views, saving and loading user preferences, persisting data to files, creating and using databases.

Learning Outcomes:

At the end of this unit, the student will be able to

1. demonstrate their skills of using Android software development tools **L4**
2. demonstrate their ability to develop software with reasonable complexity on mobile platform **L5**

UNIT – V: **08Hrs**

Content Providers: Sharing data in android, using a content provider, creating your own content providers.

Messaging and Networking: SMS Messaging, Sending E-Mail, Networking

Location-Based Services: Displaying Maps, Getting Location Data.

Learning Outcomes:

At the end of this unit, the student will be able to

- demonstrate their ability to deploy software to mobile devices **L5**
- demonstrate their ability to debug programs running on mobile devices **L5**

Text Books:

1. Beginning Android 4 Application Development, Wei-Meng Lee, Wiley India
2. Beginning Swift Programming, Wei-Meng Lee, December 2014, ISBN: 978-1-119-00931-3

Reference Books:

1. Enterprise J2ME: Developing Mobile Java Applications, Michael Juntao Yuan, Pearson Education, 2004.
2. Android Application Development for Java programming by James C. Sheusi, Cengage Learning
3. Android A Programmers Guide by Jerome DiMargio, TMH.

Course Outcomes:

At the end of this Course the student will be able to

1. demonstrate their understanding of the fundamentals of Android operating systems **L3**
2. demonstrate their skills of using Android software development tools **L4**
3. demonstrate their ability to develop software with reasonable complexity on mobile platform **L5**

IV B.Tech I SEMESTER

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

19ACS75b-REAL TIME OPERATING SYSTEMS AND APPLICATIONS

Open Elective-III

L	T	P	C
2	0	0	2

Course Objectives:

COURSE OBJECTIVES:

The objective of this course is to

- develop an understanding of various Real Time systems Application
- obtain a broad understanding of the technologies and applications for the emerging and exciting domain of real-time systems
- get in-depth hands-on experience in designing and developing a real operational system.

UNIT – 1: Introduction

8 Hrs

Definition, Typical Real Time Applications: Digital Control, High Level Controls, Signal Processing etc., Release Times, Dead-lines, and Timing Constraints, Hard Real Time Systems and Soft Real Time Systems, Reference Models for Real Time Systems: Processors and Resources, Temporal Parameters of Real Time Workload, Periodic Task Model, Precedence Constraints and Data Dependency.

Learning Outcomes:

At the end of this unit, the student will be able to

- List a range of different software testing techniques and statergies and be able to apply specific(automated) unit testing method to the projects. **L1**
- Distinguish characterstics of structural testing methods **L2**

UNIT – II: Real Time Scheduling

8 Hrs

Common Approaches to Real Time Scheduling: Clock Driven Approach, Weighted Round Robin Approach, Priority Driven Approach, Dynamic Versus Static Systems, Optimality of Effective-Deadline-First (EDF) and Least-Slack-Time-First (LST) Algorithms, Rate Monotonic Algorithm, Offline Versus Online Scheduling, Scheduling A periodic and Sporadic jobs in Priority Driven and Clock Driven Systems..

Learning Outcomes:

At the end of this unit, the student will be able to

- Demonstrate the integration testing which aims to uncover interaction and compatibility problems as early as possible. **L3**
- Discuss about the functional and system testing methods **L3**

UNIT – III: Resources Sharing

8 Hrs

Effect of Resource Contention and Resource Access Control (RAC), Non-preemptive Critical Sections, Basic Priority-Inheritance and Priority-Ceiling Protocols, Stack Based Priority- Ceiling Protocol, Use of Priority-Ceiling Protocol in Dynamic Priority Systems, Preemption Ceiling Protocol, Access Control in Multiple-Module Resources, Controlling Concurrent Accesses to Data Objects.

Learning Outcomes:

At the end of this unit, the student will be able to

- Discuss about the functional and system testing methods. **L4**
- Demonstrate various issues for object oriented testing. **L4**
-

UNIT – IV: Real Time Communication **7 Hrs**

Basic Concepts in Real time Communication, Soft and Hard RT Communication systems, Model of Real Time Communication, Priority-Based Service and Weighted Round-Robin Service Disciplines for Switched Networks, Medium Access Control Protocols for Broadcast Networks, Internet and Resource Reservation Protocols..

Learning Outcomes:

At the end of this unit, the student will be able to

- Distinguish characterstics of structural testing methods. **L5**
- Demonstrate the integration testing which aims to uncover interaction and compatibility problems as early as possible. **L4**

UNIT – V:Real Time Operating Systems and Databases **08Hrs**

Features of RTOS, Time Services, UNIX as RTOS, POSIX Issues, Characteristic of Temporal data, Temporal Consistency, Con-currency Control, Overview of Commercial Real Time databases..

Learning Outcomes:

At the end of this unit, the student will be able to

- Discuss about the functional and system testing methods. **L5**
- Demonstrate various issues for object oriented testing. **L5**

Text Books:

1. Real Time Systems – Jane W. S. Liu, Pearson Education Publication.

Reference Books:

1. . Real Time Systems – Mall Rajib, Pearson Education.
2. Real-Time Systems: Scheduling, Analysis, and Verification – Albert M. K. Cheng, Wiley.

Course Outcomes:

At the end of this Course the student will be able to

- List a range of different software testing techniques and statergies and be able to apply specific(automated) unit testing method to the projects. **L3**
- Distinguish characterstics of structural testing methods. **L4**
- Demonstrate the integration testing which aims to uncover interaction and compatibility problems as early as possible. **L5**
- Discuss about the functional and system testing methods. **L5**

IV B.Tech I SEMESTER

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

19ACS75c-FUNDAMENTALS OF BLOCKCHAIN AND APPLICATIONS

Open Elective-III

L	T	P	C
2	0	0	2

Course Objectives:

1. To study fundamental concepts in software testing.
2. To discuss various software testing issues and solutions in software unit test, integration and system testing.
3. To expose the advanced software testing topics, such as object--oriented software testing methods.

UNIT – 1: Introduction **8 Hrs**

Grasping.Blockchain Fundamentals, Tracing Blockchain's Origin,The shortcomings of current transaction systems, The emergence of bitcoin , 5 The birth of blockchain, Revolutionizing the Traditional Business, Network Exploring a blockchain application, Recognizing the key business benefits, Building trust with blockchain.

Learning Outcomes:

At the end of this unit, the student will be able to

- List a range of different software testing techniques and statergies and be able to apply specific(automated) unit testing method to the projects. **L1**
- Distinguish characterstics of structural testing methods. **L2**

UNIT – II: Blokchain working **8 Hrs**

Taking a Look at How Blockchain Works,Why It's Called "Blockchain", What Makes a Blockchain Suitable for Business, Shared ledger, Permissions Consensus, Smart contracts, Identifying Participants and Their Roles, Fundamentals of Blockchain.

Learning Outcomes:

At the end of this unit, the student will be able to

- Demonstrate the integration testing which aims to uncover interaction and compatibility problems as early as possible **L3**
- Discuss about the functional and system testing methods **L3**

UNIT – III: Business with Blockchain **8 Hrs**

Propelling Business with Blockchains, Recognizing Types of Market Friction, Information frictions, Interaction frictions, Innovation frictions, Moving Closer to Friction-Free Business, Networks Reducing information friction, Easing interaction friction, Easing innovation friction, Transforming Ecosystems through Increased Visibility.

Learning Outcomes:

At the end of this unit, the student will be able to

- Discuss about the functional and system testing methods. **L4**
- Demonstrate various issues for object oriented testing. **L4**

UNIT – IV: Blockchain in Action **7 Hrs**

Blockchain in Action: Use Cases, Financial Services, Commercial financing, Trade finance, Cross-border transactions, Insurance, Government Supply Chain Management Healthcare, Electronic medical records, Healthcare payments pre-authorization, The Internet of Things (IoT).

Learning Outcomes:

At the end of this unit, the student will be able to

- Distinguish characterstics of structural testing methods. **L5**

- Demonstrate the integration testing which aims to uncover interaction and compatibility problems as early as possible. **L4**

UNIT – V:Hyperledger **10 Hrs**

Hyperledger, a Linux Foundation Project, Hyperledger Vision, Hyperledger Fabric, How Can IBM Help Developers Innovate With Blockchain?, Offering an easily accessible cloud and development platform, Individualized attention and industry expertise.

Learning Outcomes:

At the end of this unit, the student will be able to

- Discuss about the functional and system testing methods. **L5**
- Demonstrate various issues for object oriented testing. **L5**

Text Books:

1. Fundamentals of Blockchain., RavindharVadapalli

Reference Books:

1. Block chain Technology Concepts and Applications, Kumar Saurabh, Ashutosh Saxena

Course Outcomes:

At the end of this Course the student will be able to

- List a range of different software testing techniques and statergies and be able to apply specific(automated) unit testing method to the projects. **L3**
- Distinguish characterstics of structural testing methods. **L4**
- Demonstrate the integration testing which aims to uncover interaction and compatibility problems as early as possible. **L5**
- Discuss about the functional and system testing methods. **L5**

OE - III

B.Tech IV Year I Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

19AHS15a-MANAGEMENT SCIENCE

(Humanities Elective-II)(Common to EEE , ECE & CSE)

L	T	P	C
3	0	0	3

Course Objectives:

- Understand the role of entrepreneurship in economic development.
- Identify the general characteristics of entrepreneurs.

UNIT – I

INTRODUCTION TO MANAGEMENT

Concepts of Management - Nature, importance and Functions of Management - Taylor's Scientific Management Theory, Fayol's Principles of Management, Maslow's Theory of Human Needs, Douglas McGregor's Theory X and Theory Y, Leadership Styles, Social responsibilities of Management.

DESIGNING ORGANIZATIONAL STRUCTURES

Basic concepts related to Organization - Departmentation and Decentralization, Types of mechanistic and organic structures of organization (Line organization, Line and staff organization, functional organization, Committee organization, matrix organization, team structure) their merits, demerits and suitability.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand the concept of management and organization. **L1**
- Apply the concepts & principles of management in real life industry. **L2**

UNIT – II

OPERATIONS MANAGEMENT:

Principles and Types of Plant Layout-Methods of production (Job, batch and Mass Production), Work Study. Statistical Quality Control: *c* chart, *p* chart, (simple Problems) Deming's contribution to quality.

MATERIALS MANAGEMENT: EOQ, Purchase Procedure and Stores Management. Inventory — functions. Types, inventory classification techniques.

Marketing: Functions of Marketing, Marketing Mix, and Marketing Strategies based on Product Life Cycle, Channels of distribution.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand the core concepts of Management Science and Operations Management. **L1**
- Evaluate Materials departments & Determine EOQ. **L2**

UNIT – III

HUMAN RESOURCES MANAGEMENT (HRM):

Concepts of HRM, Personnel Management and Industrial Relations (PMIR), Basic functions of HR Manager: Manpower planning, Recruitment, Selection, Training and Development, Placement, Wage and Salary Administration, Promotion, Transfer, Separation, Performance Appraisal, Grievance Handling and Welfare Administration, Job Evaluation, Merit Rating and methods.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand the concepts of HRM in Recruitment, Selection, Training & Development. **L1**
- Apply Managerial and operative Functions. **L2**

1/10/21

UNIT – IV

STRATEGIC MANAGEMENT:

Vision, Mission, Goals, Objectives, Policy, Strategy, Programmes, Elements of Corporate Planning Process, Environmental Scanning, Value Chain Analysis, SWOT Analysis, Steps in Strategy Formulation and Implementation, Generic Strategy alternatives.

PROJECT MANAGEMENT (PERT/CPM):

Network Analysis, Programme Evaluation and Review Technique (PERT), Critical Path Method (CPM), Identifying critical path, Probability of Completing the project within given time, Project Cost Analysis, Project Crashing. (Simple problems).

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand Mission, Objectives, Goals & strategies for an enterprise. **L1**
- Evaluate PERT and CPM Techniques. **L2**

UNIT – V

CONTEMPORARY MANAGEMENT PRACTICES:

Basic concepts of MIS, Materials Requirement Planning (MRP), Just-In-Time (JIT) System, Total Quality Management (TQM), Six sigma concept, Supply Chain Management, Enterprise Resource Planning (ERP), Performance Management, Business Process outsourcing (BPO), Business Process Re-engineering and Bench Marking, Balanced Score Card.

Learning Outcomes:

At the end of this unit, the student will be able to

- Analyze CRM, MRP, TQM. **L1**
- Understand modern management techniques. **L2**

Text Books:

1. **Management Science**, Aryasri: TMH, 2004.
2. **Management**, Stoner, Freeman, Gilbert, 6th Ed, Pearson Education, New Delhi, 2004.

Reference Books:

1. **Marketing Mangement**, Kotler Philip & Keller Kevin Lane: 12/e, PHI,2005.
2. **Essentials of Management** ,Koontz & Weihrich:, 6/e, TMH, 2005.
3. **Management—Principles and Guidelines**, Thomas N.Duening & John M.Biztantra, 2003.
4. **Production and Operations Management**, Kanishka Bedi, , Oxford University Press, 2004.

Course Outcomes:

At the end of this Course the student will be able to

- Equipping engineers for a lifelong career addressing the critical technical and managerial needs of private and public organizations. **L1**
- Exploring and developing analytic abilities, making better decisions, developing and executing strategies while also leading people who innovate. **L2**
- Cultivating the technical skills as well as the behavioral challenges of running organizations and complex systems. **L3**
- Emphasizing quantitative analytic skills and an entrepreneurial spirit **L4**
- Have an introductory understanding of global entrepreneurship concepts. **L5**

B.Tech IV Year I Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

19AHS15b-BUSINESS ENVIRONMENT

(Humanities Elective-II)(Common to EEE, ECE & CSE)

L	T	P	C
3	0	0	3

Course Objectives:

- To make the student understand about the business environment.
- To enable them in knowing the importance of fiscal and monitory policy.

UNIT – I: BUSINESS ENVIRONMENT

Meaning – Various environments affecting business – Social Economic; Political and Legal; Culture; Competitive Demographic; Technological and International environments.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand the concept of Business environment. **L1**
- Explain various types of business environment. **L2**

UNIT – II: FISCAL & MONETARY POLICY

FISCAL POLICY - Public Revenues - Public Expenditure - Public debt - Development activities financed by public expenditure - Evaluation of recent fiscal policy of Government of India - Highlights of Budget - **MONETARY POLICY** - Demand and Supply of Money – RBI - Objectives of monetary and credit policy - Recent trends - Role of Finance Commission.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand the concept of public revenue and public Expenditure **L1**
- Explain the functions of RBI and its role. **L2**

UNIT – III: TRADE POLICY

INDIA'S TRADE POLICY - Magnitude and direction of Indian International Trade - Bilateral and Multilateral Trade Agreements - EXIM policy and role of EXIM bank - **BALANCE OF PAYMENTS** – Structure & Major components - Causes for Disequilibrium in Balance of Payments - Correction measures.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand the role of Indian international trade. **L1**
- Analyze causes for Disequilibrium and correction measure. **L2**

UNIT – IV: WORLD TRADE ORGANIZATION

WORLD TRADE ORGANIZATION - Nature and Scope - Organization and Structure - Role and functions of WTO in promoting world trade - Agreements in the Uruguay Round – TRIPS, TRIMS, and GATT - Disputes Settlement Mechanism - Dumping and Anti-dumping Measures.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand the Dispute Settlement Mechanism. **L1**
- Compare and contrast the Dumping and Anti-dumping Measures. **L2**

UNIT – V: MARKETS

MONEY MARKETS AND CAPITAL MARKETS - Features and components of Indian financial systems - Objectives, features and structure of money markets and capital markets - Reforms and recent development – SEBI - Stock Exchanges - Investor protection and role of SEBI.

Learning Outcomes:

1/10/19

At the end of this unit, the student will be able to

- Apply the knowledge in future investments. **L1**
- Understand the role of SEBI in investor protection. **L2**

Text Books:

1. Francis Cherunilam (2009), "International Business": Text and Cases, Prentice Hallof India.
2. K. Aswathappa, "Essentials of Business Environment": Texts and Cases & Exercises 13th Revised Edition.HPH2016.

Reference Books:

1. K. V. Sivayya, V. B. M Das (2009), Indian Industrial Economy, Sultan Chand Publishers, New Delhi, India.
2. Sundaram, Black (2009), International Business Environment Text and Cases,Prentice Hall of India, New Delhi, India.
3. Chari. S. N (2009), International Business, Wiley India.
4. E. Bhattacharya (2009), International Business, Excel Publications, New Delhi.

Course Outcomes:

At the end of this Course the student will be able to

- Apply the knowledge of Money markets in future investment. **L1**
- Analyze India's Trade Policy. **L2**
- Evaluate fiscal and monitory policy. **L3**
- Develop a personal synthesis and approach for identifying business opportunities. **L4**
- `Understand various types of business environment. **L5**

B.Tech IV Year I Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

19AEC77- VLSI DESIGN LAB

L	T	P	C
0	0	3	1.5

Course Objectives: The objectives of the course are to make the students learn about

- Understand the layout design rules.
- Learn implementation of Layout, Physical Verification and place & route for complex designs.
- Verify the Layouts of DRC and LVS.

The students are required to do at least TEN experiments, design the logic circuit and test bench to perform the following experiments using necessary simulator (Mentor Graphics) to verify the logical/functional operation and to perform the analysis with appropriate synthesizer (Mentor Graphics) and then validate the implemented logic with different hardware modules/kits (FPGA kits).

List of Experiments:

1. Realization of Logic Gates.
2. 3 to 8 Decoder.
3. Priority Encoder.
4. 8X1 Multiplexer and 2X4 De-multiplexer.
5. 4 Bit Comparator.
6. D Flip-Flop.
7. Decade Counter.
8. Random Counter.
9. Universal Shift Register.
10. Single Port Synchronous RAM.
11. Synchronous FIFO.
12. Dual Port Asynchronous RAM.

Course Outcomes:

At the end of this Course the student will be able to

- Gain knowledge on the layout design rules. **L1**
- Implement Layout, Physical Verification and place & route for complex designs. **L6**
- Verify the Layouts of DRC and LVS. **L5**

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Jawaharlal Nehru Technological University Anantapur College of Engineering Pulivendula –516 390 (A.P) India

B.Tech. in Electronics and Communication Engineering

Course Structure
Under R20 Regulations

Effective from AY 2021-22

ELECTRONICS AND COMMUNICATION ENGINEERING

Semester –0			
S.No	**Course Name**	**Category**	**L-T-P-C**
1	Physical Activities -- Sports, Yoga and Meditation, Plantation	MC	0-0-6-0
2	Career Counselling	MC	2-0-2-0
3	Orientation to all branches -- career options, tools, etc.	MC	3-0-0-0
4	Orientation on admitted Branch -- corresponding labs, tools and platforms	EC	2-0-0-0
5	Proficiency Modules & Productivity Tools	ES	2-0-0-0
6	Assessment on basic aptitude and mathematical skills	MC	2-0-3-0
7	Remedial Training in Foundation Courses	MC	2-0-3-0
8	Human Values & Professional Ethics	MC	3-0-3-0
9	Communication Skills -- focus on Listening, Speaking, Reading, Writing skills	BS	2-0-2-0
10	Concepts of Programming	ES	2-0-0-0

B.Tech I Year I Semester

Semester –1					
S.No	**Course No**	**Course Name**	**Category**	**L-T-P**	**Credits**
1	20ABS05	Linear Algebra And Calculus	BS	3-0-0	3
2	20ABS03	Chemistry	BS	3-0-0	3
3	20AHS01	Communicative English	HS	3-0-0	3
4	20AME01	Engineering Graphics	ES	1-0-4	3
5	20ACS01	Problem Solving & Programming	ES	3-0-0	3
6	20AHS02	Communicative English lab	ES	0-0-3	1.5
7	20ABS04	Chemistry Lab	BS	0-0-3	1.5
8	20ACS02	Problem Solving & Programming Lab	ES	0-0-3	1.5
				Total	**19.5**

B.Tech I Year II Semester

Semester – 2					
S.No	**Course No**	**Course Name**	**Category**	**L-T-P**	**Credits**
1	20ABS06	Differential Equations & Vector Calculus	BS	3-0-0	3
2	20ABS10	Applied Physics	BS	3-0-0	3
3	20AEC01	Network Theory	ES	3-0-0	3
4	20AEE03	Basic Electrical Engineering	ES	3-0-0	3
5	20AEC03	Electronics & Communication Engineering Workshop	EC	1-0-4	3
6	20AEC02	Networks & Electrical Engineering lab	EC	0-0-3	1.5
7	20ABS11	Applied Physics Lab	BS	0-0-3	1.5
8	20AME04	Engineering Workshop	ES	0-0-3	1.5
				Total	**19.5**

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B.Tech II Year I Semester

Semester – 3					
S.No	**Course No**	**Course Name**	**Category**	**L-T-P**	**Credits**
1	20ABS12	Complex Variables and Transforms	BS	3-0-0	3
2	20AEC04	Electronic Devices & Circuits	PC	3-0-0	3
3	20AEC06	Digital Logic and Design	PC	3-0-0	3
4	20AEC08	Signals & Systems	PC	3-0-0	3
5	20AHS03	Universal Human Values	MC	3-0-0	3
6		Humanities Elective –I	HS	3-0-0	3
	20AHS04	Managerial Economics & Financial Analysis			
	20AHS05	Entrepreneurship & Incubation			
7	20ACS13	Data Structures & Python programming (Skill Oriented Course -I)	SC	1-0-2	2
8	20AEC05	Electronic Devices & Circuits Lab	PC	0-0-3	1.5
9	20AEC07	Digital Logic and Design Lab	PC	0-0-3	1.5
10	20AEC09	Signals & Systems Lab	PC	0-0-3	1.5
11	20AMC01	NSS activities	MC	0-0-2	0
				Total	**24.5**

B.Tech II Year II Semester

Semester – 4					
S.No	**Course No**	**Course Name**	**Category**	**L-T-P**	**Credits**
1	20ABS16	Probability Theory and Random Process	BS	3-0-0	3
2	20AEC10	Electronic Circuit Analysis and Design	ES	3-0-0	3
3	20AEC12	EM Waves and Transmission Lines	PC	3-0-0	3
4	20AEC13	Analog Communications	PC	3-0-0	3
5	20AEC15	Linear & Digital Integrated Circuits	PC	3-0-0	3
6	20AEC17	Advanced Digital Systems Design (Skill Oriented Course – II)	SC	1-0-2	2
7	20AEC11	Electronic Circuit Analysis and Design Lab	PC	0-0-3	1.5
8	20AEC14	Analog Communications Lab	PC	0-0-3	1.5
9	20AEC16	Linear & Digital Integrated Circuits Lab	PC	0-0-3	1.5
10	20ABS09	Environmental Science	MC	3-0-0	0
11	20AMC02	Aptitude and Reasoning Skills	MC	3-0-0	0
				Total	**21.5**
Mandatory Community Service Project/ Internship during Summer Vacation					

- Eligible & interested students are permitted to register for Honours or a Minor in IV semester after the results of III Semester are declared and students may be allowed to take maximum two subjects per semester pertaining to their Honours or a Minor from V Semester onwards.
- A student is permitted to select a Minor program only if the institution is already offering a Major degree program in that discipline.

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B.Tech III Year I Semester

Semester - 5					
S.No	**Course No**	**Course Name**	**Category**	**L-T-P**	**Credits**
1	20AEC51	Antennas & Wave Propagation	PC	3-0-0	3
2	20AEC52	Digital Communications	PC	3-0-0	3
3	20AEC53	Microprocessors & Microcontrollers	PC	3-0-0	3
4	20AEC54	Professional Elective Course – I	PE	3-0-0	3
	20AEC54A	Industrial Electronics			
	20AEC54B	Control Systems			
	20AEC54C	Information theory and coding			
5	20AEC55	Open Elective Course – I	OE	3-0-0	3
6	20AHS10	Soft Skills (Skill oriented course – III)	SC	1-0-2	2
7	20AEC57	Digital Communications Lab	PC	0-0-3	1.5
8	20AEC58	Microprocessors & Microcontrollers Lab	PC	0-0-3	1.5
9	20AEC50	Design Thinking and systems Innovation for ECE	MC	3-0-0	0
10	20AEC59	Evaluation of Community Service Project/Internship	PR	-----	1.5
				Total	**21.5**

Open Elective I (Interdisciplinary)

Branch	Subject Code	Subject
Mathematics	20ABS55A	Fuzzy Set Theory, Arithmetic and Logic
Physics	20ABS55B	Functional Nanomaterials for Engineers
Chemistry	20ABS55C	Chemistry of Energy Materials
CIVIL	20ACE55A	Basics of Civil Engineering
EEE	20AEE55A	Basics of Non-Conventional Energy Sources
ME	20AME55A	3D Printing
	20AME55B	Smart Materials
CSE	20ACS55A	Fundamentals of Internet of Things
	20ACS55B	E-Marketing
	20ACS55C	Computer Architecture and organization

Note: A student shall not be permitted to take courses as Open Electives/Minor/Honours with content substantially equivalent to the courses pursued in the student's primary major.

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B.Tech III Year II Semester

Semester - 6					
S.No	**Course No**	**Course Name**	**Category**	**L-T-P**	**Credits**
1	20AEC61	Digital Signal Processing	PC	3-0-0	3
2	20AEC62	Microwave Engineering	PC	3-0-0	3
3	20AEC63	VLSI Design	PC	3-0-0	3
4	20AEC64	Professional Elective Course – II	PE	3-0-0	3
	20AEC64A	Electronic Measurements and Instrumentation			
	20AEC64B	RF Circuit design			
	20AEC64C	Optical Communications			
5	20AEC65	Open Elective Course– II	OE	3-0-0	3
6	20AEC66	Digital Signal Processing Lab	PC	0-0-3	1.5
7	20AEC67	Microwave Engineering Lab	PC	0-0-3	1.5
8	20AEC68	VLSI Design Lab	PC	0-0-3	1.5
9	20AEC60	PCB Design and Prototype development (Skill Oriented Course – IV)	SC	1-0-2	2
10	20AHS11	Indian Constitution	MC	3-0-0	0
				Total	**21.5**
Industry Internship (Mandatory) for 6 - 8 weeks duration during summer vacation					

Note: Student shall register for MOOC Course in NPTEL/SWAYAM in concurrence with the department before commencement of semester. The advanced courses should opt which is not repetitive regular courses and syllabus.

Open Elective II (Interdisciplinary)

Branch	Subject Code	Subject Name
Mathematics	20ABS65A	Numerical Techniques
Physics	20ABS65B	Materials Characterization Techniques
Chemistry	20ABS65C	Polymers and their applications
CIVIL	20ACE65A	Environmental Impact Assessment
EEE	20AEE65A	Energy Conservation and Management
ME	20AME65A	Programming of Robots and Control
	20AME65B	Non-Conventional sources of Energy
CSE	20ACS65A	Machine Learning Applications
	20ACS65B	Object Oriented Programming
	20ACS65C	Web Design

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B.Tech IV Year I Semester

Semester - 7					
S.No	**Course No**	**Course Name**	**Category**	**L-T-P**	**Credits**
1	20AEC71	Professional Elective Course – III	PE	3-0-0	3
	20AEC71A	Artificial Intelligence & Machine learning			
	20AEC71B	Digital Image Processing			
	20AEC71C	Satellite Communications			
2	20AEC72	Professional Elective Course – IV	PE	3-0-0	3
	20AEC72A	Radar Systems			
	20AEC72B	DSP Processors & Architectures			
	20AEC72C	Cellular & Mobile Communications			
3	20AEC73	Professional Elective Course –V(Mooc-I)	PE	3-0-0	3
4		Humanities Elective Course– II	HS	3-0-0	3
	20AHS12	Management Science			
	20AHS13	Business Environment			
5	20AEC75	Open Elective Course – III	OE	3-0-0	3
6	20AEC76	Open Elective Course – IV (MOOC-II)	OE	3-0-0	3
7	20AEC70	RF System Design tools/ Industrial IOT (Skill oriented course – V)	SC	1-0-2	2
8	20AEC79	Evaluation of Internship	PR	-------	3
				Total	**23**

Open Elective III (Interdisciplinary)

Branch	Subject Code	Subject Name
Mathematics	20ABS75A	Mathematical Modeling
Physics	20ABS75B	Sensors and Actuators for Engineering Applications
Chemistry	20ABS75C	Chemistry of Nano-materials and applications
CIVIL	20ACE75A	Disaster Management and Mitigation
EEE	20AEE75A	IOT Applications in Electrical Engineering
ME	20AME75A	Introduction to Composite Materials
	20AME75B	Customer Relationship Management
CSE	20ACS75A	Applications of AI
	20ACS75B	Mobile Application Development

Open Elective-IV shall opt any of branch which shall not match with regular course and syllabus

B.Tech IV Year II Semester

Semester - 8					
S.No	**Course No**	**Course Name**	**Category**	**L-T-P**	**Credits**
1	20AEC99	Full Internship & Project work	PR	----------	12
				Total	**12**

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Courses offered for Honours degree

S.No.	Course Code	Course Title	Offered in Semester	Prerequisite if any	Contact Hours per week		Credits
					L	T	
1	20AECH01	Wireless and Mobile Communication			3	1	4
2	20AECH02	5G Communications			3	1	4
3	20AECH03	Low power VLSI design			3	1	4
4	20AECH04	Embedded systems and IoT			3	1	4
5	20AECH05	MOOC Course					2
6	20AECH06	MOOC Course					2

Title of the Minor Degree
(Disciplines to which the Minor is offered)

S. No.	Branch	Name of the Minor degree	Course Code	Course Title	Offered in Semester	Contact Hours per week			Credits
						L	T	P	
1	ECE	Electronics & Communication Engineering	20AECM01	Electronic Circuits	V	3	1	0	4
2			20AECM02	Digital Electronics	V	3	1	0	4
3			20AECM03	Principles of Communications	VI	3	1	0	4
4			20AECM04	Electronic Instrumentation	VI	3	1	0	4
5			20AECM05	MOOC Course	VII				2
6			20AECM06	MOOC Course	VII				2
1	CE	Construction Technology	20ACEM01	Building Materials	V	3	1	0	4
2			20ACEM02	Building Construction	V	3	1	0	4
3			20ACEM03	Building planning and Drawing	VI	3	1	0	4
4			20ACEM04	Surveying	VI	3	1	0	4
5			20ACEM05	MOOC Course	VII				2
6			20ACEM06	MOOC Course	VII				2
1	EEE	Electrical Systems	20AEEM01	Basic Electric Circuits and Analysis	V	3	1	0	4
2			20AEEM02	Principles of Electrical Measurements	V	3	1	0	4
3			20AEEM03	Basics of Power Electronics and Devices	VI	3	1	0	4
4			20AEEM04	Fundamentals of Control Systems	VI	3	1	0	4
5			20AEEM05	MOOC Course	VII				2
6			20AEEM06	MOOC Course	VII				2
1	ME	3D PRINTING	20AMEM07	Materials science for Engineers	V	3	1	0	4
2			20AMEM08	Computer Aided Machine Drawing	V	3	1	0	4
3			20AMEM09	3D Printing materials	VI	3	1	0	4
4			20AMEM10	Applications of 3D Printing	VII	3	1	0	4
5			20AMEM11	MOOC Course	VI				2
6			20AMEM12	MOOC Course	VII				2
1	ME	ROBOTICS AND AUTOMATION	20AMEM13	Introduction to Robotics	V	3	1	0	4
2			20AMEM14	Industrial Automation	V	3	1	0	4
3			20AMEM15	Hydraulic and Pneumatic circuits	VI	3	1	0	4
4			20AMEM16	Programming and control of Robot	VII	3	1	0	4
5			20AMEM17	MOOC Course	VI				2
6			20AMEM18	MOOC Course	VII				2

BOS Chairman   Vice Principal   Principal

1	ME	INDUSTRIAL ENGINEERING	20AMEM19	Production Planning and Control	V	3	1	0	4
2			20AMEM20	Marketing Management	VI	3	1	0	4
3			20AMEM21	Customer Relationship Management	VI	3	1	0	4
4			20AMEM22	Six Sigma & Lean Manufacturing	VII	3	1	0	4
5			20AMEM23	MOOC Course	V				2
6			20AMEM24	MOOC Course	VII				2
1	CSE	Web Design & Development	20ACSM01	User Interface Design	V	3	1	0	4
2			20ACSM02	Advanced Java Script	VI	3	1	0	4
3			20ACSM03	Content Management & Distributed systems	VI	3	1	0	4
4			20ACSM04	Mongo DB	VII	3	1	0	4
5			20ACSM05	MOOC Course	V				2
6			20ACSM06	MOOC Course	VII				2
1	CSE	Data Science	20ACSM07	Data Science	V	3	1	0	4
2			20ACSM08	Data Analytics using Python and Lab	V	3	1	0	4
3			20ACSM09	Data Visualization	VII	3	1	0	4
4			20ACSM10	Machine Learning	VI	3	1	0	4
5			20ACSM11	MOOC Course	VI				2
6			20ACSM12	MOOC Course	VII				2

BOS Chairman *Vice-Principal* *Principal*

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS):: PULIVENDULA
DEPARTMENT OF MATHEMATICS
I B.TECH – I SEMESTER (R20)
(Common to all Branches of Engineering)
(THEORY)

Subject Code	Title of the Subject	L	T	P	C
	Linear Algebra and Calculus	3	0	-	3

COURSE OBJECTIVES	
1	This course will illuminate the students in the concepts of calculus and linear algebra.
2	To equip the students with standard concepts and tools at an intermediate to advanced level mathematics to develop the confidence and ability among the students to handle various real world problems and their applications

COURSE OUTCOMES	
CO1	Develop the use of matrix algebra techniques that is needed by engineers for practical applications
CO2	Utilize mean value theorems for real life problems
CO3	Familiarize with functions of several variables which is useful in optimization
CO4	Students will also learn important tools of calculus in higher dimensions. Students will become familiar with 2 and 3- dimensional coordinate systems.
CO5	Students will learn the utilization of special functions.

SYLLABUS

Unit I: Matrix Operations and Solving Systems of Linear Equations

Rank of a matrix by echelon form, Normal form, solving system of non-homogeneous and homogeneous linear equations. Eigen values and Eigen vectors and their properties, Cayley-Hamilton theorem (without proof), finding inverse and power of a matrix by Cayley-Hamilton theorem, diagonalization of a matrix.

Unit II: Infinite series and Mean Value Theorems

Infinite series:

Series, Convergence and divergence, Geometric series, Integral test, P- series, comparison test, ratio test, root test.

Mean Value Theorems:

Rolle's Theorem, Lagrange's mean value theorem, Cauchy's mean value theorem (without proof). Expansions of functions: Taylor's and Maclaurin's series, indeterminate forms and L-Hospital rule (Limits).

BOS Chairman
Mathematics

Unit III: Multivariable calculus

Functions of several variables – Limit and Continuity, Partial derivatives, total derivatives, chain rule, change of variables, Jacobians, maxima and minima of functions of two variables, method of Lagrange multipliers for three variables.

Unit IV: Multiple Integrals

Double integrals, change of order of integration, areas enclosed by plane curves, Triple Integrals, Volume of solid as double integral and as triple integral, change of variables in double integral and Triple integral.

Unit V: Special Functions- Beta and Gamma functions

Beta and Gamma functions and their properties, relation between beta and gamma functions. Derichlet's integral and its applications (Areas and Volumes of solids).

Textbooks:

1. B. S. Grewal, Higher Engineering Mathematics, 44/e, Khanna Publishers, 2017.
2. Erwin Kreyszig, Advanced Engineering Mathematics, 10/e, John Wiley & Sons, 2011.

References:

1. B. V. Ramana, Higher Engineering Mathematics, Tata Mc-Grawhill publishing company Ltd., New Delhi.
2. R. K. Jain and S. R. K. Iyengar, Advanced Engineering Mathematics, 3/e, Alpha Science International Ltd., 2002.
3. George B. Thomas, Maurice D. Weir and Joel Hass, Thomas Calculus, 13/e, Pearson Publishers, 2013.
4. Glyn James, Advanced Modern Engineering Mathematics, 4/e, Pearson publishers, 201.

Mercy

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS), PULIVENDULA

B.Tech – I Yr I sem (R20)

L T P C
3 0 0 3

Chemistry

(EEE, ECE and CSE)

Course Objectives:

- To familiarize engineering chemistry and its applications
- To train the students on the principles and applications of electrochemistry, Spectroscopy and polymers
- To introduce instrumental methods and modern engineering materials.

Unit 1: Structure and Bonding Models: (10 hrs)

Planck's quantum theory, dual nature of matter, Schrodinger equation, significance of Ψ and Ψ^2, applications to hydrogen, molecular orbital theory – bonding in homo- and heteronuclear diatomic molecules – energy level diagrams of N_2, O_2, CO and NO, π-molecular orbitals of butadiene and benzene, calculation of bond order.

Learning Outcomes:

At the end of this unit, the students will be able to

- **apply** Schrodinger wave equation to hydrogen atom (L3)
- **recall** molecular orbital theory and energy level diagrams of atoms (L1)
- **illustrate** the molecular orbital energy level diagram of different molecular species (L2)
- **explain** the calculation of bond order of O_2 and CO molecules (L2)
- **discuss** the basic concept of molecular orbital theory (L3)

Unit 2: Modern Engineering materials: (12 hrs)

i). Understanding of materials: Crystal field theory – salient features – splitting in octahedral, tetrahedral and square planar geometry. Properties of coordination compounds- oxidation state, coordination number, magnetic properties and colour.

ii). Semiconductor materials, superconductors- basic concept, band diagrams for conductors, semiconductors and insulators, effect of doping on band structures.

iii). Supercapacitors: Introduction, basic concept-classification – applications.

iv). Nanochemistry: Introduction, classification of nanometerials, properties and applications of fullerenes, carbon nanotubes and graphene nanoparticles.

Learning Outcomes:

At the end of this unit, the students will be able to

- **explain** splitting of in octahedral and tetrahedral geometryof complexes (L2).
- **recall** applications of semiconductors, super conductors, nanomaterials (L1)
- **discuss** the magnetic behaviour and colour of coordination compounds (L3).
- **explain** the band theory of solids for conductors, semiconductors and insulators (L2)
- **demonstrate** the application of fullerenes, carbon nano tubes and graphene nanoparticles (L2).

Unit 3: Electrochemistry and Applications: (12 hrs)

Introduction to electrochemistry, electrodes – concepts of reference electrodes (Calomel electrode, Ag/AgCl electrode and glass electrode); Electrochemical cell, Nernst equation, cell potential calculations and numerical problems, pH metry, potentiometry- potentiometric titrations (redox titrations), concept of conductivity- Specific, equivalent & molar conductance and.cell constant, conductivity cell, conductometric titrations (acid-base titrations).

Electrochemical sensors – potentiometric sensors (glucose potentiometric sensor), amperometric sensors(Estimation of Uric Acid (UA))

Primary cells – Zinc-air, Na-Air batteries, secondary cells – Nickel-Cadmium (NiCd),and lithium ion batteries- working of the batteries including cell reactions; fuel cells: hydrogen-oxygen, methanol fuel cells – working of the cells and applications.

Learning Outcomes:

At the end of this unit, the students will be able to

- **apply** Nernst equation for calculating electrode and cell potentials (L3)
- **recall** applications of various batteries (L1).
- **explain** the theory of construction of battery and fuel cells (L2)
- **solve** problems based on cell potential (L3)

Unit 4: Polymer Chemistry: (10 hrs)

Introduction to polymers, functionality of monomers, chain growth and step growth polymerization, coordination polymerization, copolymerization (stereospecific polymerization) with specific examples and mechanisms of polymer formation.

Plastics - Thermoplastics and Thermosettings, Preparation, properties and applications of – PVC, Teflon, Bakelite, Nylon-6,6, carbon fibres. Calculation of molecular Weight of polymer by weight average and number average methods, polydispersity index

Elastomers–Buna-S, Buna-N–preparation, properties and applications.

Conducting polymers – polyacetylene, polyaniline, polypyrroles – mechanism of conduction and applications.

Learning Outcomes:

At the end of this unit, the students will be able to

- **explain** the different types of polymers and their applications (L2)
- **find** number average and weight average of polymer (L1)
- **explain** the preparation, properties and applications of Bakelite, Nylon-6,6, and carbon fibres (L2)
- **describe** the mechanism of conduction in conducting polymers (L2)
- **discuss** Buna-S and Buna-N elastomers and their applications (L2)

Unit 5: Instrumental Methods and Applications (8 hrs)

Regions of electromagnetic spectrum. Absorption of radiation: Beer-Lambert's law. UV-Visible, IR Spectroscopies- Principle, selection rules and applications. Solid-Liquid Chromatography– TLC, retardation factor.

Dany

Learning outcomes:

After completion of Unit IV, students will be able to:

- **explain** the different types of spectral series in electromagnetic spectrum (L2)
- **understand** the principles of UV-Vis, IR Spectroscopy (L2)
- **find** retention time and volumes of samples (L1)
- **explain** the various applications of analytical instruments (L2)

Text Books:

1. Jain and Jain, Engineering Chemistry, 16/e, DhanpatRai, 2013.

2. Arun Bahl, B.S. Bahl and G.D. Tuli, Essentials of Physical Chemistry, S.Chand Publication, New Delhi 2012.

Reference Books:

1.G.V.Subba Reddy, K.N.Jayaveera and C. Ramachandraiah, Engineering Chemistry, Mc Graw Hill, 2020.

2. J.D. Lee, Concise Inorganic Chemistry, 5/e, Oxford University Press, 2008.

3. K. Sesha Maheswaramma and Mridula Chugh, Engineering Chemistry, Pearson Publication Pvt. Ltd.

4. Skoog and West, Principles of Instrumental Analysis, 6/e, Thomson, 2007.

Course Outcomes:

At the end of the course, the students will be able to:

- **compare** the materials for construction of battery and electrochemical sensors (L2)
- **recall** properties and applications of polymers and engineering materials (L1)
- **explain** the preparation, properties, and applications of thermoplastics & thermosetting, elastomers & conducting polymers. (L2)
- **explain** the principles of spectrometry, TLC in separation of solid and liquid mixtures (L2)
- **apply** the principle of Band diagrams in application of conductors and semiconductors (L3)

JNTUA COLLEGE OF ENGINEERING :(AUTONOMOUS), PULIVENDULA

I B.TECH

COMMUNICATIVE ENGLISH (R20)

(Common to All Branches of Engineering)

L	T	P	C
3	0	0	3

1. INTRODUCTION:

The course is designed to train students in receptive (listening and reading) as well as productive and interactive (speaking and writing) skills by incorporating a comprehensive, coherent and integrated approach that improves the learners' ability to effectively use English language in academic/ workplace contexts. The shift is from *learning about the language* to *using the language.* component of campus placement tests. Activity based teaching-learning methods would be adopted to ensure that learners would engage in actual use of language both in the classroom and laboratory sessions.

2. COURSE OBJECTIVES

1	Facilitate effective listening skills for better comprehension of academic lectures and English spoken by native speakers
2	Focus on appropriate reading strategies for comprehension of various academic texts and authentic materials
3	Help improve speaking skills through participation in activities such as role plays, discussions and structured talks/oral presentations
4	Impart effective strategies for good writing and demonstrate the same in summarizing, writing well organized essays, record and report useful information
5	Provide knowledge of grammatical structures and vocabulary and encourage their appropriate use in speech and writing

3. COURSE OUTCOMES

CO1	Retrieve the knowledge of basic grammatical concepts.
CO2	Understand the context, topic, and pieces of specific information from social or transactional dialogues spoken and the improve the fluency of English..
CO3	Apply grammatical structures to formulate sentences and correct word forms
CO4	Analyze discourse markers to speak clearly on a specific topic in informal discussions
CO5	Evaluate reading/listening texts and to write summaries based on global comprehension of these texts.
CO6	Create a coherent paragraph interpreting a figure/graph/chart/table.

4. SYLLABUS:

UNIT –I

Reading: **What Is My Name? —P Sathyavathi**

- ***Writing:*** Paragraph writing
- ***Listening***: Listening for theme-main
- ***Functional English***: Greeting, taking leave and introducing oneself and others
- ***Grammar:*** Parts of speech- Nouns –classification-usages- Pronouns -classifications-usages-
- ***Vocabulary*:** Homonyms- Homophones- Homographs

Non Detailed Study: Listening Skills from **English and Soft Skills**

UNIT-II

Reading **: The Kitchen — Vimala**

- ***Writing*** : Essay Writing –Descriptive Essays
- ***Listening*** : Listening for theme -1
- ***Functional English***: Making requests
- ***Grammar:*** Types of sentences- Question Tags
- ***Vocabulary*** : Synonyms - Antonyms

Non detailed Study: Teamwork Skills from **English and Soft Skills**

UNIT-III

Reading **: Adivasis — Kancha Ilaiah**

- ***Writing*** : Statement of Purpose
- ***Listening:*** Listening for main ideas
- ***Functional English:*** Inviting -Apologizing
- ***Grammar:***– Kinds of verbs – Auxiliaries- Tenses,
- ***Vocabulary*** : Prefixes –Suffixes – One-word substitutes

Non detailed Study: Assertive Skills from **English and Soft Skills**

UNIT-IV

Reading**: The Bet – Anton Chekhov**

- ***Writing:*** Letter Writing –Official letters-business Letters-Application Letters
- ***Listening***: Listening for details
- ***Functional English:*** Interrupting - Asking for and giving opinions
- ***Grammar:*** Adjectives- Conjunctions- Articles – Active & Passive Voice
- ***Vocabulary***: Phrasal verbs -Idioms

Non detailed Study: Learning Skills from **English and Soft Skills**

UNIT-V

Reading **: The Gift of the Magi - O. Henry**

- ***Writing:*** Information Transfer
- ***Listening*** : Listening for opinions
- ***Functional English*** : Asking for the time and directions
- ***Grammar:*** Prepositions- Reported Speech
- ***Vocabulary*** : Commonly confused words

Non detailed Study : Emotional Intelligence Skills from **English and Soft Skills**

5. Prescribed Text books:

[1] **Detailed text: English for Fluency**, K Purushottam, Orient Black Swan,2013.

[2] **Non detailed text: English and Soft Skills**, S P Dhanavel, Orient Black Swan 2013Edition.

6. REFERENCES:

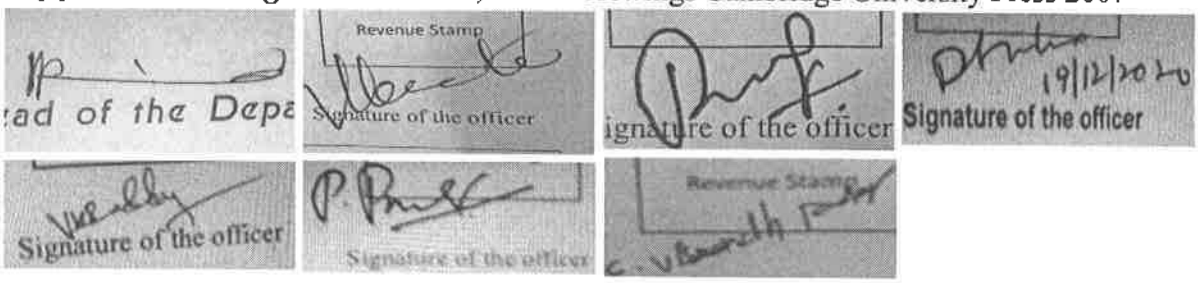
[1] **A Practical Course in Effective English Speaking Skills**. J.K.Gangal, PHI, New Delhi.2012

[2] **Fundamentals of Technical Communication,** Meenakshi Raman, Oxford University Press,2015.

[3] **Spoken English**, R.K. Bansal & JB Harrison, Orient Longman,2013, 4^{Th} edition.

[4] **Murphy's English Grammar** with CD, Murphy, Cambridge University Press,3 Rd edition.

[5] **Advanced English Grammar** , Martin Hewings Cambridge University Press 2007



B.Tech I Year I Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

20AME01 - ENGINEERING GRAPHICS

(Common to EEE, ECE)

L	T	P	C
1	0	4	3

Course Objectives:

- To bring awareness that Engineering Drawing is the Language of Engineers.
- To familiarize how industry communicates technical information.
- To teach the practices for accuracy and clarity in presenting the technical information.
- To develop the engineering imagination essential for successful design.
- To train the usage of 2D and 3D modeling

UNIT – 1: Introduction to Engineering Graphics **8 Hrs**

Principles of Engineering Graphics and their significance – Conventions in drawing – Lettering – BIS conventions.

a) Conic sections including the rectangular hyperbola – general method only.
b) Cycloids, Epicycloids and Hypocycloids.
c) Involutes

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand basic principles of engineering graphics (L2)
- Identify the various BIS conventions (L3)
- Draw conic sections used in engineering graphics (L3)
- Draw cycloids and involutes (L3)

UNIT – II: Projection of Points, Lines and Planes **8 Hrs**

Projection of points in any quadrant, Lines inclined to one and both planes, Finding true lengths, Angle made by line. Projections of regular plane surfaces.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand the basics of projections. (L2)
- Find the true lengths of line when the line inclined to both the planes. (L5)
- Draw projections of regular plane surfaces (L3)

UNIT – III: Projections of Solids **8 Hrs**

Projections of Solids : Projections of regular solids inclined to one and both planes by rotational and auxiliary views method.

Learning Outcomes:

At the end of this unit, the student will be able to

- Identify 2D projections of regular solids (L1)
- Draw projections of regular solids when inclined to both the planes. (L3)

UNIT – IV: Sections of Solids **7 Hrs**

Section planes and sectional view of right regular solids – Prism, Cylinder, Pyramid and Cone. True shapes of the sections.

Learning Outcomes:

At the end of this unit, the student will be able to

- Use section plane to show the sectional view of regular solids. (L3)
- Draw sectional view of prism and cylinder (L3)
- Draw true shape of sections.(L3)

UNIT – V: Development of Surfaces: **10 Hrs**

Development of surfaces of right regular solids – Prism, Cylinder, Pyramid, Cone and their sectional parts

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand basics of development of surfaces (L1)
- Draw development of surface of prism and cylinder(L3)
- Draw development of surface of cone and their sectional parts(L3)

Text Books:

1. K.L.Narayana & P.Kannaiah, Engineering Drawing, 3/e, Scitech Publishers, Chennai, 2012.
2. N.D.Bhatt, Engineering Drawing, 53/e, Charotar Publishers, 2016.

Reference Books:

1. Dhanajay A Jolhe, Engineering Drawing, Tata McGraw-Hill, Copy Right, 2009.
2. Shah and Rana, Engineering Drawing, 2/e, Pearson Education, 2009.
3. Venugopal, Engineering Drawing and Graphics, 3/e, New Age Publishers, 2000.
4. K.C.John, Engineering Graphics, 2/e, PHI, 2013.
5. Basant Agarwal & C.M.Agarwal, Engineering Drawing, Tata McGraw-Hill, Copy Right, 2008.

Course Outcomes:

At the end of this Course the student will be able to

- Draw various curves applied in engineering. (L3)
- Show projections of Lines, planes and solids. (L1)
- Draw the sections of solids and development of surfaces of solids. (L3)
- Use computers as a drafting tool. (L3)
- Draw isometric and orthographic drawings. (L3)

B.Tech I Year I Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

20ACS01 - PROBLEM SOLVING & PROGRAMMING

(ECE)

L	T	P	C
3	0	0	3

Course Objectives:

- Introduce the internal parts of a computer, and peripherals.
- Introduce the Concept of Algorithm and use it to solve computational problems.
- Identify the computational and non-computational problems.
- Teach the syntax and semantics of a C Programming language.
- Demonstrate the use of Control structures of C Programming language.
- Illustrate the methodology for solving Computational problems.

UNIT – I: Computer Fundamentals **8hrs**

Computer Fundamentals: What is a Computer, Evolution of Computers, Generations of Computers, Classification of Computers, Anatomy of a Computer, Introduction to Operating systems, and Operational overview of a CPU.

Introduction to Programming, Algorithms and Flowcharts: Programs and Programming, Programming languages, Compiler, Interpreter, Loader, Linker, Program execution, Fourth generation languages, Fifth generation languages, Classification of Programming languages, Algorithms, Pseudo-code, Flowcharts, Strategy for designing algorithms.

Learning Outcomes:

At the end of this unit, the student will be able to

- To understand why C is a useful scripting language for developers. **L1**
- To learn how to design and program C applications.. **L1**

UNIT – II: Introduction to problem solving **8hrs**

Introduction to problem solving: Introduction, the problem-solving aspect, Design and implementation of algorithms – Topdown design, Analysis of Algorithms, the efficiency of algorithms, the analysis of algorithms.

Fundamental algorithms: Exchanging the values of two variables, counting, summation of a set of numbers, factorial computation, sine function computation, generation of the Fibonacci sequence, reversing the digits of an integer.

Learning Outcomes:

At the end of this unit, the student will be able to

- To learn how to solve the programs in C. **L2**
- To learn about algorithms. **L2**
- To learn how to use algorithms in C programs. **L2**

UNIT – III: Types, Operators, and Expressions **8hrs**

Types, Operators, and Expressions: Variable names, data types and sizes, constants, declarations, arithmetic operators, relational and logical operators, type conversions, increment and decrement operators, bitwise operators, assignment operators and expressions, conditional expressions precedence and order of evaluation.

Input and output: standard input and output, formatted output-Printf, formatted input-Scanf.

Control Flow: Statements and blocks, if-else, else-if, switch, Loops-while and for, Loops-Do-while, break and continue, goto and labels.

Functions and Program Structure: Basics of functions, functions returning non-integers, external variables, scope variables, header variables, register variables, block structure, initialization, recursion, the C processor.

Learning Outcomes:

At the end of this unit, the student will be able to

- To learn Types, Operators, and Expressions in C. **L3**
- To learn how to write functions and pass arguments in C. **L3**

UNIT – IV: Factoring methods **7 Hrs**

Factoring methods: Finding the square root of a number, the smallest divisor of a number, the greatest common divisor of two integers, generating prime numbers.

Pointers and arrays: Pointers and addresses, pointers and function arguments, pointers and arrays, address arithmetic, character pointers and functions, pointer array; pointers to pointers, Multi-dimensional arrays, initialization of arrays, pointer vs. multi-dimensional arrays, command line arguments, pointers to functions, complicated declarations.

Array Techniques: Array order reversal, finding the maximum number in a set, removal of duplicates from an order array, finding the k^{th} smallest element.

Learning Outcomes:

At the end of this unit, the student will be able to

- To learn how to build Factoring methods. **L3**
- To learn about pointers and arrays. **L3**
- To learn how to use array techniques. **L3**

UNIT – V: Sorting and Searching

Sorting and Searching: Sorting by selection, sorting by exchange, sorting by insertion, sorting by partitioning, binary search.

Structures: Basics of structures, structures and functions, arrays of structures, pointers to structures, self-referential structures, table lookup, typedef, unions, bit-fields.

Some other Features: Variable-length argument lists, formatted input-Scanf, file access, Error handling-stderr and exit, Line Input and Output.

Learning Outcomes:

At the end of this unit, the student will be able to

- To learn how to sorting in C. **L4**
- To learn how to Searching in C. **L5**

Text Books:

1. Brian W. Kernighan, and Dennis M. Ritchie, "The C Programming Language", 2nd Edition, Pearson.
2. R.G. Dromey, "How to Solve it by Computer". 2014, Pearson.
3. Pradip Dey, and Manas Ghosh, "Programming in C", 2018, Oxford University Press.

Reference Books:

1. RS Bichkar "Programming with C", 2012, Universities Press.
2. Pelin Aksoy, and Laura Denardis, "Information Technology in Theory", 2017, Cengage.
3. Byron Gottfried and Jitender Kumar Chhabra, "Programming with C", 4th Edition, 2019, McGraw Hill Education.

Course Outcomes:

At the end of this Course the student will be able to

- Identify the different peripherals, ports and connecting cables in a PC. **L2**
- Illustrate the working of a Computer. **L3**
- Select the components of a Computer in the market and assemble a computer. **L4**
- Solve complex problems using language independent. **L3**

JNTUA COLLEGE OF ENGINEERING :(AUTONOMOUS), PULIVENDULA
I B.TECH
COMMUNICATIVE ENGLISH LABORATORY (R20)
(Common to All Branches of Engineering)

L	T	P	C
0	0	3	1.5

Course Objectives

- students will be exposed to a variety of self-instructional, learner friendly modes of language learning
- students will learn better pronunciation through stress, intonation and rhythm
- students will be trained to use language effectively to face interviews, group discussions, public speaking
- students will be initiated into greater use of the computer in resume preparation, report writing, format making etc

Course Outcomes

- CO1: Listening and repeating the sounds of English Language
- CO2: Understand the different aspects of the English language proficiency with emphasis on LSRW skills
- CO3: Apply communication skills through various language learning activities
- CO3: Analyze the English speech sounds, stress, rhythm, intonation and syllable division for better listening and speaking comprehension.
- CO5: Evaluate and exhibit acceptable etiquette essential in social and professional settings
- CO6: Create awareness on mother tongue influence and neutralize it in order to improve fluency in spoken English.

Unit 1

1. Phonetics-Importance -Introduction to Sounds of Speech
2. Vowels and Consonants Sounds
3. Phonetic Transcription

Learning Outcomes

At the end of the module, the learners will be able to

- understand different accents spoken by native speakers of English
- employ suitable strategies for skimming and scanning on monitor to get the general idea of a text and locate specific information
- learn different professional registers and specific vocabulary to describe different persons, places and objects

Unit 2

1. Word Stress & Intonation
2. Communication skills
3. Role Play & JAM

Learning Outcomes
At the end of the module, the learners will be able to

- produce a structured talk extemporarily
- comprehend and produce short talks on general topics
- participate in debates and speak clearly on a specific topic using suitable discourse markers

Unit 3

1. Describing people/objects/places
2. Speeches for Special Occasions
3. Etiquettes of Telephonic Communication

Learning Outcomes
At the end of the module, the learners will be able to

- Learn different ways of greeting and introducing oneself/others
- summarize the content with clarity and precision and take notes while listening to a talk/lecture and make use of them to answer questions
- replenish vocabulary with one word substitutes, homonyms, homophones, homographs to reduce errors in speech and writing

Unit4

1. Group Discussions
2. Debates
3. Interviews Skills

Learning Outcomes
At the end of the module, the learners will be able to

- Learn different ways of asking information and giving directions
- Able to transfer information effectively
- understand non-verbal features of communication

Unit 5

1. Resume writing & Practicing
2. Oral Presentations
3. Writing Video Speeches as it is & Book reviews – oral and written

Learning Outcomes

At the end of the module, the learners will be able to

- make formal oral presentations using effective strategies
- learn different techniques of précis writing and paraphrasing strategies
- comprehend while reading different texts and edit short texts by correcting common errors

Suggested Software

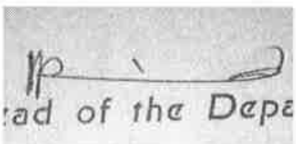
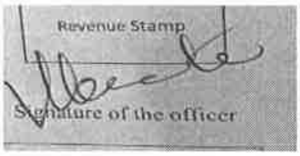
- Orell
- Walden Infotech
- Young India Films

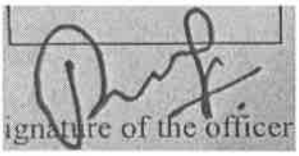
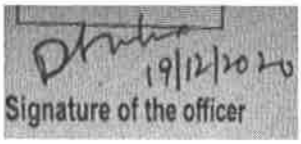
Reference Books

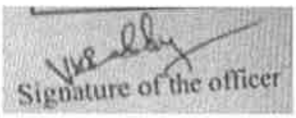
- Bailey, Stephen. *Academic writing: A handbook for international students*. Routledge, 2014.
- Chase, Becky Tarver. *Pathways: Listening, Speaking and Critical Thinking*. Heinley ELT; 2nd Edition, 2018.
- Skillful Level 2 Reading & Writing Student's Book Pack (B1) Macmillan Educational.
- Hewings, Martin. *Cambridge Academic English (B2)*. CUP, 2012.
- A Textbook of English Phonetics for Indian Students by T.Balasubramanyam

Web Links

- www.esl-lab.com
- www.englishmedialab.com
- **www.englishinteractive.net**



JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS), PULIVENDULA

B.Tech – I Yr I Sem (R20)

L T P C
0 0 3 1.5

Chemistry Lab
(EEE, ECE and CSE)

Course Objectives:

- Verify the fundamental concepts with experiments

List of Experiments:

1. Conductometric titration of strong acid vs. strong base.
2. Conductometric titration of weak acid vs. strong base.
3. Determination of cell constant and conductance of solutions.
4. Potentiometry - determination of redox potentials and emfs.
5. Acid-base totration by pH metry.
6. Determination of Strength of an acid in Pb-Acid battery.
7. Preparation of polymer- bakelite.
8. Verification Lambert-Beer's law.
9. Estimation of manganese by colorimetry.
10. Separation of organic mixtures by Thin layer chromatography.
11. Identification of simple organic compounds by IR.
12. Preparation of nanomaterials by precipitation.
13. Estimation of Ferrous Iron by Dichrometry.

Course Outcomes:

At the end of the course, the students will be able to

- **determine** the cell constant and conductance of solutions (L3)
- **find** conductivity of acid and base (L1)
- **prepare** polymer Bakelite materials (L2)
- **measure** the strength of an acid present in secondary batteries (L3)
- **analyse** the IR spectra of some organic compounds (L3)

B.Tech I Year I Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

20ACS02 - Problem Solving & Programming Laboratory

(ECE)

L	T	P	C
0	0	3	1.5

Course Objectives:

- 1. Introduce the internal parts of a computer, and peripherals.
- 2. Introduce the Concept of Algorithm and use it to solve computational problems
- 3. Identify the computational and non-computational problems
- 4. Teach the syntax and semantics of a C Programming language
- 5. Demonstrate the use of Control structures of C Programming language
- 6. Illustrate the methodology for solving Computational problems

List of Experiments:

1. Assemble and disassemble parts of a Computer
2. Design a C program which reverses the number
3. Design a C program which finds the second maximum number among the given list of numbers
4. Construct a program which finds the k^{th} smallest number among the given list of numbers.
5. Design an algorithm and implement using C language the following exchanges
   $a \leftarrow b \leftarrow c \leftarrow d$
6. Develop a C Program which counts the number of positive and negative numbers separately and also compute the sum of them.
7. Implement the C program which computes the sum of the first n terms of the series
   Sum = 1 – 3 + 5 -7 + 9
8. Design a C program which determines the numbers whose factorial values are between 5000 and 32565.
9. Design an algorithm and implement using a C program which finds the sum of the Infinite series $1 - x^2/2! + x^4/4! - x^6/6! + ...$

10 Design a C program to print the sequence of numbers in which each number is the sum of the three most recent predecessors. Assume first three numbers as 0, 1, and 1.

11. Implement a C program which converts a hexadecimal, octal and binary number to decimal number and vice versa.
12. Develop an algorithm which computes the all the factors between 1 to 100 for a given Number and implement it using C.
13. Construct an algorithm which computes the sum of the factorials of numbers between m and n.
14. Design a C program which reverses the elements of the array.
15. Given a list of n numbers, Design an algorithm which prints the number of stars equivalent to the value of the number. The starts for each number should be printed horizontally.
16. Implement the sorting algorithms

a. Insertion sort b. Exchange sort c. Selection sort d. Partitioning sort.

17. Illustrate the use of auto, static, register and external variables.
18. Develop a C program which takes two numbers as command line arguments and finds all the common factors of those two numbers.
19. Design a C program which sorts the strings using array of pointers.

Course Outcomes:

At the end of this Course the student will be able to

- 1. Identify the different peripherals, ports and connecting cables in a PC (L2) **L2**
- 2. Illustrate the working of a Computer (L3) **L3**
- 3. Select the components of a Computer in the market and assemble a computer (L4) **L4**
- 4. Solve complex problems using language independent notations (L3) **L3**

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS):: PULIVENDULA
DEPARTMENT OF MATHEMATICS
I B.TECH – II SEMESTER (R20)
(Common to all Branches of Engineering)
(THEORY)

Subject Code	Title of the Subject	L	T	P	C
	Differential Equations and Vector Calculus	3	0	-	3

COURSE OBJECTIVES	
1	To enlighten the learners in the concept of differential equations and vector calculus
2	To furnish the learners with basic concepts and techniques at plus two level to lead them into advanced level by handling various real world applications.

COURSE OUTCOMES	
CO1	Solve the linear differential equations related to various engineering fields
CO2	Solve the differential equations reducible to linear, and finds the relevant applications.
CO3	Identify solution methods for partial differential equations that model physical processes
CO4	Interpret the physical meaning of different operators such as gradient, curl and divergence
CO5	Estimate the work done against a field, circulation and flux using vector calculus and also to establish the relations between them using vector integral theorems.

SYLLABUS

UNIT I: Differential Equations

First order and first degree differential equations – Formation, Exact, Linear and Bernoulli equations. Applications to Newton's law of cooling and law of natural growth and decay.

Non-homogeneous Linear Differential Equations of second Higher Order with constant coefficients with RHS terms of the type e^{ax+b}, $\sin(ax+b)$, $\cos(ax+b)$, polynomials in x, $e^{ax}V(x)$, $xV(x)$ where $V(x)$ is a function of x, Method of variation of parameters.

UNIT II: Equations Reducible to Linear Differential Equations with constant coefficients and Applications

Cauchy's and Legendre's linear equations, simultaneous linear equations with constant coefficients.

Applications: Mass spring system and L-C-R Circuit problems.

Mrdy

UNIT III: Partial Differential Equations

Linear partial differential equations of first order, non-linear PDEs of first order (standard forms). Solutions to homogenous linear partial differential equations with constant coefficients, Rules for finding the complementary function and the particular integral.

UNIT IV: Vector differential Calculus

Scalar and vector point functions, Del applied to scalar point functions: Gradient, Del applied to vector point functions: Divergent and Curl and their properties.

Del applied to twice to point functions and Del applied to products of point functions (Identities).

UNIT V: Vector integral Calculus

Line integral- Circulation -work done - potential function, Surface integral-flux, volume integral.

Vector integral theorems: Green's theorem in the plane, Stoke's theorem, Gauss Divergence theorem (all theorems without proof) and related problems.

Textbooks:

1. B. S. Grewal, Higher Engineering Mathematics, 44/e, Khanna publishers, 2017.
2. Erwin Kreyszig, Advanced Engineering Mathematics, 10/e, John Wiley & Sons, 2011.

References:

1. B. V. Ramana, Higher Engineering Mathematics, Tata Mc-Grawhill publishing company Ltd., New Delhi.
2. R. K. Jain and S. R. K. Iyengar, Advanced Engineering Mathematics, 3/e, Alpha Science International Ltd., 2002.
3. Dennis G. Zill and Warren S. Wright, Advanced Engineering Mathematics, Jones and Bartlett, 2011.
4. Glyn James, Advanced Modern Engineering Mathematics, 4/e, Pearson publishers, 2011.

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS):: PULIVENDULA

B. Tech. I Year Syllabus (R20 Regulation)

Applied Physics

(ECE, EEE & CSE)

L T P C
3 0 0 3

COURSE OBJECTIVES	
1	To make a bridge between the physics in school and engineering courses.
2	To identify the importance of the optical phenomenon i.e. interference, diffraction and polarization related to its Engineering applications
3	To understand the mechanisms of emission of light, the use of lasers as light sources for low and high energy applications, study of propagation of light wave through optical fibres along with engineering applications.
4	To explain the significant concepts of dielectric and magnetic materials that leads to potential applications in the emerging micro devices.
5	To enlighten the concepts of Quantum Mechanics and to provide fundamentals of de'Broglie waves, quantum mechanical wave equation and its applications, the importance of free electron theory and band theory of solids.
6.	Evolution of band theory to distinguish materials, basic concepts and transport phenomenon of charge carriers in semiconductors. To give an impetus on the subtle mechanism of superconductors using the concept of BCS theory and their fascinating applications.

Unit-I: Wave Optics **12hrs**

Interference- Principle of superposition – Interference of light –Interference by wavefront and amplitude division - Interference in thin films (Reflection Geometry) – Colours in thin films – Newton's Rings – Determination of wavelength of light source and refractive index of liquid.

Diffraction- Introduction – Fresnel and Fraunhofer diffraction – Fraunhofer diffraction due to single slit, double slit - Diffraction grating – Grating spectrum.

Polarization- Introduction – Types of polarization – Polarization by reflection, refraction and double refraction (Qualitative) - Nicol's Prism - Half wave and Quarter wave plates with applications.

Unit Outcomes:

The students will be able to

- **Explain** the need of coherent sources and the conditions for sustained interference (L2)
- **Identify** engineering applications of interference (L3)
- **Analyze** the differences between interference and diffraction with applications (L4)
- **Illustrate** the concept of polarization of light and its applications (L2)
- **Classify** ordinary polarized light and extraordinary polarized light (L2)

Unit-II: Lasers and Fiber optics **8hrs**

Lasers- Introduction – Characteristics of laser – Spontaneous and Stimulated emission of radiation – Einstein's coefficients – Population inversion – Lasing action – Pumping mechanisms – CO_2 laser – Semi conductor Laser - Applications of lasers.

Fiber optics- Introduction – Principle of optical fiber – Acceptance Angle – Numerical Aperture – Classification of optical fibers based on refractive index profile and modes – Propagation of electromagnetic wave through optical fibers – Fiber optic communication system – Losses in optical fibers – Applications.

Unit Outcomes:

The students will be able to

- **Understand** the basic concepts of LASER light Sources (L2)
- **Apply** the concepts to learn the types of lasers (L3)
- **Identifies** the Engineering applications of lasers (L2)
- **Explain** the working principle of optical fibers (L2)
- **Classify** optical fibers based on refractive index profile and mode of propagation (L2)
- **Identify** the applications of optical fibers in various fields (L2)

Unit-III: Dielectric and Magnetic Materials **8hrs**

Dielectric Materials- Introduction – Dielectric polarization – Dielectric polarizability, Susceptibility and Dielectric constant – Types of polarizations: Orientation polarizations (Qualitative), Ionic and Electronic Polarizations – Lorentz internal field – Clausius-Mossotti equation – Dielectric breakdown – Dielectric Loss – Piezoelectricity and Ferro electricity.

Magnetic Materials- Introduction – Magnetic dipole moment – Magnetization – Magnetic susceptibility and Permeability – Origin of permanent magnetic moment – Classification of magnetic materials: Dia, Para, Ferro, Ferri & Antiferro – Domain concept of Ferromagnetism (Qualitative) – Hysteresis – Soft and Hard magnetic materials.

Unit Outcomes:

The students will be able to

- **Explain** the concept of dielectric constant and polarization in dielectric materials (L2)
- **Summarize** various types of polarization of dielectrics (L2)
- **Interpret** Lorentz field and Claussius-Mosotti relation in dielectrics (L2)
- **Apply** the concept of polarization to materials like piezoelectric and ferroelectrics (L3)
- **Classify** the magnetic materials based on susceptibility and their temperature dependence (L2)
- **Explain** the applications of dielectric and magnetic materials (L2)
- **Apply** the concept of magnetism to magnetic devices (L3)

Unit IV: Quantum Mechanics, Free Electron Theory and Band theory of Solids **10hrs**

Quantum Mechanics- Dual nature of matter (de Broglie hypothesis) – Schrodinger's time independent wave equation – Significance of wave function – Particle in a one-dimensional infinite potential well.

Free Electron Theory- Classical free electron theory – Quantum free electron theory – Equation for electrical conductivity – Fermi-Dirac distribution – Density of states (Qualitative) – Fermi energy.

Band theory of Solids- Bloch's Theorem (Qualitative) – Kronig-Penney model (Qualitative) – E vs k diagram – Classification of crystalline solids – Effective mass of electron – m^* vs k diagram – Concept of hole.

Unit Outcomes:

The students will be able to

- **Explain** the concept of dual nature of matter (L2)
- **Understand** the significance of wave function (L2)
- **Interpret** the concepts of classical and quantum free electron theories (L2)
- **Explain** the importance of K-P model
- **Classify** the materials based on band theory (L2)
- **Apply** the concept of effective mass of electron (L3)

Unit – V: Semiconductors and Superconductors **10hrs**

Semiconductors- Introduction – Intrinsic semiconductors – Density of charge carriers – Electrical conductivity – Fermi level – Extrinsic semiconductors – Density of charge carriers – Dependence of Fermi energy on carrier concentration and temperature – Drift and diffusion currents – Einstein's equation – Direct and indirect band gap semiconductors – Hall effect – Applications of semiconductors.

Superconductors- Introduction – Properties of superconductors – Meissner effect – Type I and Type II superconductors – BCS theory – Josephson effects (AC and DC) – High T_c superconductors – Applications of superconductors.

Unit Outcomes:

The students will be able to

- **Classify** the energy bands of semiconductors (L2)
- **Interpret** the direct and indirect band gap semiconductors (L2)
- **Identify** the type of semiconductor using Hall effect (L2)
- **Identify** applications of semiconductors in electronic devices (L2)
- **Explain** how electrical resistivity of solids changes with temperature (L2)
- **Classify** superconductors based on Meissner's effect (L2)
- **Explain** Meissner's effect, BCS theory & Josephson effect in superconductors (L2)

Text books:

1. Engineering Physics by M. N. Avadhanulu, P.G. Kshirsagar & TVS Arun Murthy S.Chand Publications, 11^{th} Edition (2019).
2. Engineering Physics" by D.K. Bhattacharya and Poonam Tandon, Oxford press (2018).

Reference Books:

1. Engineering Physics – Shatendra Sharma, Jyotsna Sharma, Pearson Education, (2018)
2. Introduction To Solid State Physics, Charles Kittel, 8^{th} Ed.,Wiley India Edition.
3. Engineering Physics by M.R. Srinivasan, New Age international publishers (2014).
4. Engineering Physics – K. Thyagarajan, McGraw Hill Publishers (2018).
5. Engineering Physics - Sanjay D. Jain, D. Sahasrambudhe and Girish, University Press (2016).
6. Semiconductor physics and devices- Basic principle – Donald A, Neamen, Mc Graw Hill (2014).

COURSE OUTCOMES	
CO1	**Study** the different realms of physics and their applications in both scientific and technological systems through physical optics. (L2)
CO2	**Identify** the wave properties of light and the interaction of energy with the matter (L3). **Asses** the electromagnetic wave propagation and its power in different media (L5).
CO3	**Understands** the response of dielectric and magnetic materials to the applied electric and magnetic fields. (L3)
CO4	**Study** the quantum mechanical picture of subatomic world along with the discrepancies between the classical estimates and laboratory observations of electron transportation phenomena by free electron theory and band theory. (L2)
CO5	**Elaborate** the physical properties exhibited by materials through the understanding of properties of semiconductors and superconductors. (L5)

B.Tech I Year II Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

20AEC01 - NETWORK THEORY

L	T	P	C
3	0	0	3

Course Objectives: The objectives of the course are to make the students learn about

- To introduce basic laws, mesh & nodal analysis techniques for solving electrical circuits
- To impart knowledge on applying appropriate theorem for electrical circuit analysis
- To explain transient behavior of circuits in time and frequency domains
- To teach concepts of resonance
- To introduce open circuit, short circuit, transmission, hybrid parameters and their interrelationship.

UNIT – I: INTRODUCTION TO ELECTRICAL CIRCUITS

Passive components and their V-I relations, Energy sources - Ideal, Non-ideal, Independent and dependent sources, Source transformation Kirchoff's laws, Star–to-Delta or Delta-to-Star Transformations, Mesh analysis and Nodal analysis problem solving, Super node and Super mesh for DC Excitations.

Learning Outcomes:

At the end of this unit, the student will be able to

- Gain knowledge on basic network elements, voltage and current laws **L1**
- Apply Kirchhoff's laws, network reduction techniques on simple electrical circuits with dependent & independent sources **L3**
- Solve complex circuits using mesh and nodal analysis techniques **L3**

UNIT – II: NETWORK THEOREMS

Superposition theorem, Thevenin & Norton theorems, Maximum power transfer theorem, Reciprocity theorem, Millman theorem, Miller Theorem, Compensation theorem - problem solving using dependent sources also, Duality and dual networks.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand significance of duality and dual networks **L2**
- Select appropriate theorem for network simplification **L6**
- Determine maximum power transfer to the load **L5**

UNIT – III: AC CIRCUITS AND TRANSIENTS

A.C Circuits: Characteristics of Sine wave, phase relation in pure Resistor, Inductor and Capacitor, Impedance, Admittance, Series and Parallel circuits, Power, problem solving using R-L-C elements with DC excitation and AC excitation.

Transients: Steady state and Transient response, DC Response of R-L, R-C and R-L-C, circuits, Sinusoidal Response of R-L, R-C and R-L-C circuit, Circuit elements in S-domain.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand behavior of circuit elements under switching conditions **L2**
- Analyze response of RL, RC & RLC circuits in time & frequency domains **L4**
- Evaluate initial conditions in RL, RC & RLC circuits **L5**

UNIT – IV: RESONANCE AND COUPLED CIRCUITS

Resonance: Series Resonance, Voltages and Currents in a Series Resonant Circuit, Quality factor and its effect on Bandwidth, Parallel resonance, Magnification.

Coupled Circuits: Introduction to Coupled circuits, Self Inductance , Mutual inductance, dot convention, Coefficient of Coupling, Series and Parallel connection of Coupled Coils.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand magnetically coupled circuits **L1**
- Determine resonant frequency and bandwidth of a simple series or parallel RLC circuit **L5**
- Determine voltages and currents in a resonant circuit **L5**

UNIT – V: TWO PORT NETWORKS & NETWORK FUNCTIONS

Two-Port Networks: Two port networks, Open circuit Impedance (Z) parameters, Short circuit Admittance (Y) parameters, Transmission (ABCD) parameters, Inverse Transmission (A'B'C'D') parameters, Hybrid (h) parameters, Inverse hybrid (g) parameters, Inter- relationships of different parameters, Inter-connection of two-port networks, T and π Representation.

Concept of complex frequency, driving point and transfer functions for one port and two port network, poles & zeros of network functions, Restriction on Pole and Zero locations of network function

Learning Outcomes:

At the end of this unit, the student will be able to

- Determine network parameters for given two port network. **L5**
- Relate different two port network parameters. **L3**
- Represent transfer function for the given network. **L1**

Text Books:

1. W. H. Hayt and J. E. Kemmerly, "Engineering Circuit Analysis", McGraw HillEducation, 2013.
2. M. E. Van Valkenburg, "Network Analysis", Prentice Hall, 2006.

Reference Books:

1. D. Roy Choudhury, "Networks and Systems", New Age International Publications,1998.
2. Network lines and Fields by John. D. Ryder 2nd edition, Asia publishing house.
3. Joseph Edminister and Mahmood Nahvi, "Electric Circuits", Schaum's Outline Series, Fourth Edition, Tata McGraw Hill Publishing Company, New Delhi, 2003.
4. Network Analysis by A. Sudhakar and Shyammohan S palli. McGraw-Hill, 5th Edition.

Course Outcomes:

At the end of this Course the student will be able to

- Solve network problems using mesh and nodal analysis techniques **L3**
- Analyze networks using Thevenin, Norton, Maximum power transfer, Superposition, Miller and Millman theorems **L4**
- Compute responses of first order and second order networks using time & frequency domain analysis **L5**
- Design resonant circuits for given bandwidth **L6**
- Utilize Z, Y, ABCD and h parameters for analyzing two port circuit behavior **L4**

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JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR
COLLEGE OF ENGINEERING (Autonomous), PULIVENDULA

I B.Tech – II Sem (ECE)

L	T	P	C
3	0	0	3

ELECTRICAL TECHNOLOGY

Course Objectives: Student can be able to know

- The constructional features of DC machines, different types of DC machines and their characteristic.
- The constructional details of single phase transformer and their performance characteristics by conducting suitable tests.
- The analysis of three phase balanced and unbalanced circuits, Three phase induction motors and their characteristics.
- The constructional feature and operation of synchronous machines.

UNIT- I DC Generators

Generators – Principle of Operation – Constructional Features – E. M.F Equation– Numerical Problems – Methods of Excitation – Separately Excited and Self Excited Generators – Build-Up of E.M.F - Critical Field Resistance and Critical Speed - Load Characteristics of Shunt, Series and Compound Generators- Applications

Unit Outcomes:

- To know about principle of operation of a DC machine working as a generator
- To distinguish between self and separately excited generators and classification
- To know how emf is developed
- To distinguish between critical field resistance and critical speed
- To know about various characteristics of different types of generators

UNIT – II DC Motors

Motors – Principle of Operation – Back E.M.F. –Torque Equation – Characteristics and Application of Shunt, Series and Compound Motors-Speed Control of D.C. Motors: Armature Voltage and Field Flux Control Methods. Three Point Starter-Losses – Constant & Variable Losses – Calculation of Efficiency - Swinburne's Test.

Unit Outcomes:

- To know about principle of operation of DC machine working as a motor
- To know about torque developed and how to control speed of DC shunt motor
- To know about necessity of starter
- To know about various load characteristics of various types of DC motors

UNIT-III SINGLE PHASE TRANSFORMERS & THREE PHASE A.C. CIRCUITS

Introduction - Single Phase Transformers- Constructional Details and Applications - Emf Equation - Operation on No Load and on Load - Phasor Diagrams-Equivalent Circuit - Losses and Efficiency-Regulation- OC and SC Tests - Predetermination of Efficiency and Regulation. Analysis of Balanced Three Phase Circuits – Phase Sequence- Star and Delta Connection - Relation between Line and Phase Voltages and Currents in Balanced Systems - Measurement of Active and Reactive Power in Balanced and Unbalanced Three Phase Systems.

Unit Outcomes:

- To understand the principle of operation of 1-ϕ transformer
- To understand computation and predetermination of regulation of a 1-ϕ transformer
- To know about basics of three phase circuits
- To distinguish between phase voltages, currents, line values and phase values and balanced and unbalanced three phase circuits and power measurement

UNIT-IV 3-PHASE INDUCTION MOTORS

Polyphase Induction Motors-Construction Details and Applications of Cage and Wound Rotor Machines- - Principle of Operation – Slip- Rotor Emf and Rotor Frequency - Torque Equation- Torque Slip Characteristics – Losses and efficiency.

Unit Outcomes:

- To know about principle of operation of three phase induction motor
- To distinguish between squirrel cage and slip ring induction motors
- To know about various losses and computation of efficiency of induction motor
- To know about the torque developed by the induction motor
- To understand various characteristics of induction motor

UNIT – V SYNCHRONOUS MACHINES

Principle and Constructional Features of Salient Pole and Round Rotor Machines – E.M.F Equation- Applications , Voltage Regulation by Synchronous Impedance Method- Theory of Operation of Synchronous Motor.

Unit Outcomes:

- To know about principle of working of alternator
- To distinguish between salient pole and cylindrical rotor machines
- To know about emf equation
- To know about predetermination of regulation of alternator by synchronous impedance method
- To know about principle of operation of synchronous motor

Course Outcomes:

After completing the course, the student should be able to do the following:

CO1: Able to calculate the e.m.f. generated on DC Generator also able to control speed of different DC motors.

CO2: Able to conduct open circuit and short circuit tests on single phase transformer for knowing their characteristics.

CO3: Able to analyse three phase circuits, three induction motor operating principle and know their torque slip characteristics.

CO4: Able to have knowledge on synchronous machine with which he/she can able to apply the above conceptual things to real-world problems and applications

TEXT BOOKS:

1. I.J.Nagrath & D.P.Kothari, "Electric Machines", 7th Edition, Tata Mc Graw Hill, 2005
2. T.K.Nagsarkar and M.S. Sukhija, " Basic Electrical Engineering", 3rd Edition, Oxford University Press2017.
3.

REFERENCE BOOKS:

1. B. R. Gupta, "Fundamentals of Electric Machines", Vandana Singhal, 3rd Edition, New age International Publishers, 2005.
2. S. Kamakashiah, "Electromachanics – III", overseas publishers Pvt. Ltd.
3. V.K. Mehta and Rohit Mehta, "Principles of Electrical Engineering", S.Chand Publications, 2005.

B.Tech I Year II Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

20AEC03- ECE WORKSHOP

L	T	P	C
1	0	4	3

Course Objectives: The objectives of the course are to make the students learn about

- To introduce electronic components, measuring instruments and tools used in electronic workshop.
- To give hands on experience with the use of laboratory equipment.
- To equip with the knowledge of understanding data sheets.
- To give working experience with prototype board, solder and de-solder the electronic components on a project board.
- To introduce EDA tools
- To provide knowledge in understanding working of various communication systems

Theory Concepts

- Introduce the materials required and construction of basic electronic components.
- Explain the usage of electronic workshop tools.
- Explain the applications and testing procedure of electronic components.
- Explain the working of basic electronic measuring instruments (Block diagram approach).
- Explain the basic communication systems (Block diagram approach) and their applications.

List of Exercises / Experiments

1. Familiarization/Application of commonly used Electronic Workshop Tools : Bread board, Solder, cables, relays, switches, connectors, fuses, Cutter, plier, screwdriver set, wire stripper, flux, knife/blade, soldering iron, de-soldering pump etc.
2. Familiarization/Application of testing and measuring instruments like Voltmeter, Ammeter, Multimeter, Power Supplies, CRO, DSO, Function Generator, Frequency counter.
3. Familiarization/Identification of electronic components (Resistors, Capacitors, Inductors, Diodes, transistors, IC's etc.) – Functionality, type, size, color coding, package, symbol, cost etc.
4. Testing of electronic components like Resistor , Capacitor , Diode , Transistor etc. using Multimeter.
5. Study of CRO and to i) find the Amplitude and Frequency using CRO ii) measure the Unknown Frequency & Phase difference using CRO
6. Interpret data sheets of discrete components and IC's, estimation and costing.
7. Introduction to EDA Tools: MULTISIM/PSPICE/TINA schematic capture tool, learning of basic functions of creating a new project, getting and placing parts, connecting placed parts, simulating the schematic, plotting and analyzing the results.
8. Assembling and testing of simple electronic circuits on breadboards, assembling and soldering components on a PCB (Kit Assembling)
9. Familiarization of the following electronic systems
   - Assembling and dismantling of desktop computer/laptop/mobile phones.
   - PA system with different microphones, loud speakers, mixer etc.
10. Demonstrate working of various Communication Systems like Radio receiver, Television and Mobile communication system

References:

1. Dr. B.S. Chowdhry & Ahsan A. Ursani, The First Practical Book on Electronic Workshop, Mehran Infotech Consultants, Hyderabad.
2. Paul Horowitz & Ian Robinson, "Laboratory Manual for Art of Electronics", Cambridge University Press.
3. S M Dhir, Electronic Components & Materials, 2nd Edition, Tata McGraw - Hill Publishing Company Limited
4. Dr.S.K.Bhattacharya, Dr. S.Chatterji, Textbook of Projects in Electrical, Electronics, Instrumentation and Computer Engineering, S. Chand Publishers., New Delhi.
5. Sengupta R., Textbook of Principles and Reliable Soldering Techniques, New Age International Ltd.

Course Outcomes:

At the end of this Course the student will be able to

- Identify discrete components and ICs. **L1**
- Perform soldering- de-soldering techniques. **L3**
- Assemble simple electronic circuits over a PCB. **L1**
- Perform measurements using various electronic instruments such as Cathode ray oscilloscope, multimeter and function generator. **L3**
- Testing of various components. **L5**
- Interpret specifications (ratings) of the component. **L1**
- Demonstrate working of various communication systems. **L1**

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JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

COLLEGE OF ENGINEERING (Autonomous), PULIVENDULA

I B.Tech – II Semester (ECE)

L	T	P	C
0	0	3	1.5

NETWORKS AND ELECTRICAL TECHNOLOGY LAB

Course Objectives:

- To gain hands on experience in verifying network theorems
- To analyze transient behavior of circuits
- To study resonance characteristics
- To determine 2-port network parameters
- To study performance of DC generators and DC motors
- To study performance of 1-ϕ transformer and 3-ϕ Induction motors
- To study performance of on Alternator

LIST OF EXPERIMENTS

Any Six from the following experiments

1. Verification of Superposition & Reciprocity Theorem
2. Verification of Thevenin's and Norton's Theorem
3. Verification of Maximum Power Transfer Theorem
4. Measure and calculate RC time constant for a given RC circuit
5. Measure and calculate RL time constant for a given RL circuit
6. Design a series RLC resonance circuit. Plot frequency response and find resonance frequency , Bandwidth , Q – factor.
7. Measure and calculate Z, Y parameters of two-port network.
8. Measure and calculate ABCD & h parameters of two-port network.

Any Six from the following experiments

1. OCC of a separately excited DC generator
2. Load characteristics of DC shunt generator
3. Load characteristics of DC shunt motor
4. Swinburne's test
5. Speed control of DC shunt motor
6. OC & SC tests on a 1-ϕ transformer
7. Load test on Squirrel cage Induction motor
8. Predetermination of regulation of alternator by Synchronous impedance method

Course Outcomes:

- Verify network theorems
- Measure time constants of RL & RC circuits
- Design resonant circuit for given specifications
- Characterize and model the network in terms of all network parameters
- To understand various characteristics of DC generators and DC motors
- To predetermine the efficiency and regulation of a 1-ϕ transformer
- To understand various characteristics of Induction motors and Synchronous machines

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS):: PULIVENDULA

B.Tech I Year Syllabus (R20 Regulation)

Applied Physics Laboratory

(ECE, EEE & CSE)

L	T	P	C
0	0	3	1.5

Course Objectives:

- Understands the concepts of interference, diffraction and their applications.
- Understand the role of optical fiber parameters in communication.
- Recognize the importance of energy gap in the study of conductivity and Hall Effect in a semiconductor.
- Illustrates the magnetic and dielectric materials applications.
- Apply the principles of semiconductors in various electronic devices.

Note: In the following list, out of 15 experiments, any 10 experiments must be performed in a semester

List of Applied Physics Experiments

1. Determination of the thickness of thin object using wedge shape method
   Experimental outcomes:
   Operates optical instrument like travelling microscope. (L2)
   Estimate the thickness of the wire using wedge shape method (L2)
   Identifies the formation of interference fringes due to reflected light from non-uniform thin film. (L2)
2. Determination of the radius of curvature of the lens by Newton's rings
   Experimental outcomes:
   Operates optical instrument like travelling microscope. (L2)
   Estimate the radius of curvature of the lens (L2)
   Identifies the formation of interference fringes due to reflected light from non-uniform thin film. (L2)
   Plots the square of the diameter of a ring with no. of rings (L3)
3. Determination of wavelengths of various spectral lines of mercury source using diffraction grating in normal incidence method
   Experimental outcomes:
   Operates optical instrument like spectrometer. (L2)
   Estimate the wavelength of the given source (L2)
   Identifies the formation of grating spectrum due diffraction. (L2)
4. Determination of dispersive power of prism.
   Experimental outcomes:
   Operates optical instrument like spectrometer. (L2)
   Estimate the refractive index and dispersive power of the given prism (L2)
   Identifies the formation of spectrum due to dispersion. (L2)
5. Determination of wavelength using diffraction grating by laser source.
   Experimental outcomes:
   Operates various instrument (L2)
   Estimate the wavelength of laser source (L2)
   Identifies the formation of grating spectrum due diffraction. (L2)
6. Determination of particle size by laser source.
   Experimental outcomes:
   Operates various instrument (L2)
   Estimate the Particles size using laser (L2)
   Identifies the application of laser (L2)
7. Determination of numerical aperture and acceptance angle of an optical fiber
   Experimental outcomes:
   Operates various instruments and connect them as per the circuit. (L2)
   Estimate the numerical aperture and acceptance angle of a given optical fiber. (L2)
   Identifies the significance of numerical aperture and acceptance angle of an optical fiber in various engineering applications. (L2)
8. Determination of dielectric constant and Curie temperature of a ferroelectric material.
   Experimental outcomes:
   Operates various instruments and connect them as per the circuit. (L2)
   Estimate thedielectric constantof the given substance. (L2)
   Identifies the significance of dielectric constant in various devices. (L2)

9. Study of variation of Magnetic field along the axis of a current carrying coil – Stewart-Gee's Method.
Experimental outcomes:
Operates various instruments and connect them as per the circuit. (L2)
Estimate the magnetic field along the axis of a circular coil carrying current. (L2)
Plots the intensity of the magnetic field of circular coil carrying current with distance (L3)

10. Measurement of magnetic susceptibility by Gouy's method
Experimental outcomes:
Operates various instruments and connect them as per the circuit. (L2)
Estimate the magnetic susceptibility of the given material. (L2)
Identifies the significance of magnetic susceptibility in various engineering applications. (L2)

11. Study of B-H curve of Ferromagnetic material
Experimental outcomes:
Operates various instruments and connect them as per the circuit. (L2)
Estimate the hysteresis loss, coercivity and retentivity of the ferromagnetic material. (L2)
Classifies the soft and hard magnetic material based on B-H curve. (L2)
Plots the magnetic field H and flux density B (L3)

12. Determination of the resistivity of semiconductor by four probe method
Experimental outcomes:
Operates various instruments and connect them as per the circuit. (L2)
Estimate the resistivity of a semiconductor. (L2)
Identifies the importance of four probe method in finding the resistivity of semiconductor. (L3)

13. Study of Energy gap of a material using p-n junction diode
Experimental outcomes:
Operates various instruments and connect them as per the circuit. (L2)
Estimate the energy gap of a semiconductor. (L2)
Illustrates the engineering applications of energy gap. (L3)
Plots 1/T with log R (L3)

14. Determination of mobility of charge carriers in semiconductor by Hall Effect.
Experimental outcomes:
Operates various instruments and connect them as per the circuit. (L2)
Estimate the charge carrier concentration and mobility in a semiconductor. (L2)
Illustrates the applications of Hall Effect. (L3)
Plots the voltage with current and voltage with magnetic field (L3)

15. Determination of losses in optical fiber.
Experimental outcomes:
Operates various instruments and connect them as per the circuit. (L2)
Estimate the numerical aperture and acceptance angle of a given optical fiber. (L2)
Identifies the significance of losses in optical fiber and its engineering applications. (L2)

Course Outcomes:
The students will be able to

- **Operate** optical instruments like microscope and spectrometer (L2)
- **Determine** thickness of a hair/paper with the concept of interference (L2)
- **Estimate** the wavelength of different colors using diffraction grating and resolving power (L2)
- **Plot** the intensity of the magnetic field of circular coil carrying current with distance (L3)
- **Evaluate** the acceptance angle of an optical fiber and numerical aperture (L3)
- **Determine** the resistivity of the given semiconductor using four probe method (L3)
- **Identify** the type of semiconductor i.e., n-type or p-type using hall effect (L3)
- **Calculate** the band gap of a given semiconductor (L3)

References:

1. S. Balasubramanian, M.N. Srinivasan "A Text book of Practical Physics"- S Chand Publishers, 2017.
2. http://vlab.amrita.edu/index.php -Virtual Labs, Amrita University

B.Tech I Year II Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

20AME04 - ENGINEERING WORKSHOP

(ECE)

L	T	P	C
0	0	3	1.5

Course Objectives:

- To bring awareness about workshop practices for Engineers.
- To familiarize how wood working operations can be performed.
- To teach the practices for sheet metal operations.
- To develop the technical skills related to fitting and electrical wiring.

Section 1 : Wood Working

Familiarity with different types of woods and tools used in wood working and make following joints

a) Half – Lap joint
b) Mortise and Tenon joint
c) Corner Dovetail joint or Bridle joint
d) Wood turning operation

Section 2 : Sheet Metal Working

Familiarity with different types of tools used in sheet metal working, Developments of following sheet metal job from GI sheets

a) Tapered tray b) Conical funnel c) Elbow pipe d) Brazing & Riveting

Section 3 : Fitting

Familiarity with different types of tools used in fitting and do the following fitting exercises

a) V-fit b) Dovetail fit c) Contour Fitting
d) Bicycle tire puncture and change of two wheeler tyre

Section 4 : Electrical Wiring

Familiarities with different types of basic electrical circuits and make the following connections

a) Parallel and series b) Two way switch c) Godown lighting d) Tube light
e) Three phase motor f) Soldering of wires

Text Books:

1. K.Venkata Reddy., Workshop Practice Manual, 6/e BS Publications.
2. Kannaiah P. and Narayana K.L., Workshop Manual, 2/e, Scitech publishers.
3. John K.C., Mechanical Workshop Practice. 2/e, PHI 2010.

Course Outcomes:

At the end of this Course the student will be able to

- Apply wood working skills in real world applications. (L6)
- Apply fitting operations in various applications. (L6)
- Build different parts with metal sheets in real world applications. (L5)
- Demonstrate soldering and brazing. (L4)
- Apply basic electrical engineering knowledge for house wiring practice. (L6)

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

II Year B.Tech. I-Sem (R20)

20ABS12-COMPLEX VARIABLES AND TRANSFORMS

(Common for EEE& ECE)

L	T	P	C
3	0	0	3

Course Objectives:

- To gain the knowledge of the basic probability concepts and acquire skills in handling situations (L3)
- Involving more than one random variable and functions of random variables. (L3)
- To understand the principles of random signals and random processes. (L2)
- To be acquainted with systems involving random signals. L(3)
- To gain knowledge of standard distributions that can describe real life phenomena. (L4)

UNIT – 1: Complex Variables – Differentiation:

Introduction to functions of complex variable-concept of Limit & continuity- Differentiation, Cauchy-Riemann equations in Cartesian and Polar coordinates (without proof), analytic functions, harmonic functions, finding harmonic conjugate-construction of analytic function by Milne Thomson method. Properties of elementary functions of exponential, trigonometric, hyperbolic, and logarithm.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand functions of Complex variable and its properties. L1
- Find derivatives of complex functions. L3
- Understand the analyticity of complex functions. L2

UNIT – II: Complex Variables – Integration:

Line integral-Contour integration, Cauchy's integral theorem (with proof), Cauchy Integral formula, Cauchy Integral formula for derivatives (All theorems without Proof).

Power series expansions: Taylor's series and Laurent's series (without proof); zeros of analytic functions, singularities.

Residues: Evaluation of residue by formula and by Laurent's series, Cauchy Residue theorem (without proof), Evaluation of definite integral involving sine and cosine, Evaluation of certain improper integrals (around unit circle, semi-circle with *f(z)* not having poles on real axis).

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand the integration of complex functions. L2
- Apply Cauchy's integral theorem and Cauchy's integral formula. L3
- Understand singularities of complex functions. L2
- Evaluate improper integrals of complex functions using Residue theorem. L3

UNIT – III: Laplace Transforms:

Definition-Laplace transform of standard functions-existence of Laplace Transform – Inverse transform – First shifting Theorem, Transforms of derivatives and integrals – Unit step function – Second shifting theorem – Dirac's delta function – Convolution theorem – Laplace transform of Periodic function. Differentiation and integration of transform – solving Initial value problems to ordinary differential equations with constant coefficients using Laplace transforms.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand the concept of Laplace transforms and finds the Laplace transforms of elementary functions. L2
- Find the Laplace transforms of general functions using its properties. L3
- Understand Laplace transforms of special functions (Unit step function, Unit Impulse & Periodic). L2
- Apply Laplace transforms to solve Differential Equations. L3

UNIT – IV: Fourier series:

Fourier coefficients (Euler's formulae) – Dirichlet conditions for the existence of Fourier series – functions having discontinuity-Fourier series of Even and odd functions – Fourier series in an arbitrary interval – Half-range Fourier sine and cosine expansions. Complex form of Fourier series.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand finding Fourier series expression of the given function. L2
- Determine Fourier coefficients (Euler's) and identify existence of Fourier series of the given function. L3
- Expand the given function in Fourier series given in Half range interval. L3

UNIT – V: Fourier transforms & Z Transforms:

Fourier Integrals & Fourier Transforms: Fourier integral theorem (without proof) – Fourier sine and cosine integrals-complex form of Fourier integral.

Fourier transform – Fourier sine and cosine transforms – Properties – Inverse transforms – convolution theorem – Finite Fourier Sine and Cosine transforms.

Z-transform – Inverse z-transform – Properties – Damping rule – Shifting rule – Initial and final value theorems. Convolution theorem – Solution of difference equations by z - transforms.

Learning Outcomes:

At the end of this unit, the student will be able to

- Find Fourier Sine and cosine integrals and Understand Fourier transforms. L3
- Apply properties of Fourier transforms. L3
- Apply Z transforms to solve difference equations. L3

Text Books:

1. B.S.Grewal, "Higher Engineering Mathematics", Khanna publishers.
2. Advanced Engineering Mathematics, R K Jain and S R K Iyengar, Narosa Publishing House, New Delhi.
3. Erwin Kreyszig, "Advanced Engineering Mathematics", Wiley India

Reference Books:

1. B.V.Ramana, Higher, "Engineering Mathematics", McGraw Hill publishers.
2. Alan Jeffrey, "Advanced Engineering Mathematics", Elsevier.

Course Outcomes:

At the end of this Course the student will be able to

- Understand the elementary functions of complex variable. L1
- Understand the analyticity of complex functions and conformal mappings. L2
- Apply Cauchy's integral formula and Cauchy's integral theorem to evaluate improper integrals along contours. L3
- Understand the usage of Laplace Transforms, Fourier Transforms and Z transforms. L3
- Evaluate the Fourier series expansion of periodic functions. L3

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B.Tech II Year I Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

20AEC04 - ELECTRONIC DEVICES AND CIRCUITS

L	T	P	C
3	0	0	3

Course Objectives: The objectives of the course are to make the students learn about

1. To provide a comprehensive idea about semiconductors, working of PN junction diode.
2. To acquire knowledge about special diodes and applications of PN junction diode like rectifiers, clippers and clampers.
3. To explain the construction and working of Bipolar junction transistors and Field effect transistors.
4. To introduce various biasing and stabilization circuits.
5. To analyze BJT modeling using h-parameters and to find h-parameters of BJT in different configurations.

UNIT – I:

Semiconductors: Intrinsic and extrinsic semiconductors, mobility and conductivity, Fermi level and carrier concentration of semiconductors, Mass action law, variation of semiconductor parameters with temperature, Drift and diffusion currents, continuity equation, Hall Effect.

PN junction diode: Band structure of PN Junction, Quantitative Theory of PN Diode, types of PN junction diode, VI Characteristics, PN diode current equation, Diode resistance, Transition and Diffusion Capacitance, effect of temperature on PN junction diode, Illustrative problems.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand the semiconductor materials properties and their importance in semiconductor devices **L2**
- Summarize the working of PN Junction diode and its parameters **L2**

UNIT – II:

Special Diodes: Zener and Avalanche Breakdowns, VI Characteristics of Zener diode, Zener diode as voltage regulator, Construction, operation and VI characteristics of Tunnel Diode, Varactor Diode, LED, LCD, Photo Diode, SCR and UJT.

Diode applications: Half-wave, Full-wave and Bridge Rectifiers with and without Filters, Ripple Factor and Regulation Characteristics, Clipping and Clamping circuits, Voltage doubler , Illustrative problems.

Learning Outcomes:

At the end of this unit, the student will be able to

- Know the usage of special diodes in different applications **L1**
- Compare the working of rectifier circuits with and without filters **L2**

UNIT – III:

Bipolar Junction Transistors: Transistor construction, BJT Operation, Transistor as an Amplifier, Common Emitter, Common Base and Common Collector Configurations, Limits of Operation, BJT Specifications.

Field Effect Transistors: The Junction Field Effect Transistor (Construction, Principle of Operation), Pinch off Voltage, VI Characteristics, CG,CS and CD configurations, FET as Voltage Variable Resistor, Comparison between BJT and FET, MOSFET Construction, VI Characteristics and working in depletion and enhancement mode.

Learning Outcomes:

At the end of this unit, the student will be able to

- Know the construction, operation, characteristics and applications of BJT & FET's **L1**
- Compare the working of BJT & FET's in different configurations **L2**

UNIT – IV:

BIASING AND STABILISATION: Operating Point, DC and AC Load Lines, Importance of Biasing, Fixed Bias, Collector to Base Bias, Self Bias, Bias Stability, Stabilization against Variations in I_{CO} V_{BE} and β, Bias Compensation Using Diodes and Transistors, Thermal Runaway, Condition for Thermal Stability in CE configuration, Illustrative problems.

Learning Outcomes:

At the end of this unit, the student will be able to

- Know the importance of DC, AC Load lines & Biasing **L1**
- Apply biasing and compensation circuits for providing stability against variations in $I_{CO,}$ V_{BE} and β **L3**

UNIT – V:

SMALL SIGNAL ANALYSIS OF AMPLIFIERS: BJT Modeling using h-parameters, Determination of h-Parameters from Transistor Characteristics, Measurement of h-Parameters, Analysis of CE, CB and CC configurations using h-Parameters, Comparison of CB, CE and CC configurations, Simplified Hybrid Model, Illustrative problems.

Learning Outcomes:

At the end of this unit, the student will be able to

- Determine and measure h-parameters of a BJT. **L1**
- Analyze CE, CB & CC Configuration's using h-parameters **L4**

Text Books:

1. Electronics Devices and Circuits, J.Millman and Christos. C. Halkias, 3rd edition, Tata McGraw Hill, 2006.
2. Electronics Devices and Circuits Theory, David A. Bell, 5th Edition, Oxford University press. 2008.

Reference Books:

1. Electronics Devices and Circuits Theory, R.L.Boylestad, Lousis Nashelsky and K.Lal Kishore, 12th edition, 2006, Pearson, 2006.
2. Electronic Devices and Circuits, N.Salivahanan, and N.Suresh Kumar, 3rd Edition, TMH, 2012.
3. Solid State Electronic Devices, Ben G. Streetman and Sanjay Banerjee Prentice Hall, 2000

Course Outcomes:

At the end of this Course the student will be able to

1. Get a comprehensive idea about semiconductors, working of PN junction diode. **L2**
2. Acquire knowledge about special diodes and applications of PN junction diode like rectifiers, clippers and clampers. **L1**
3. Understand the construction and working of bipolar junction transistors and Field effect transistors. **L2**
4. Compare the working of various biasing and stabilization circuits. **L2**
5. Analyze and find h-parameters of BJT in different configurations. **L4**

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B.Tech II Year I Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

20AEC06 - DIGITAL LOGIC AND DESIGN

L	T	P	C
3	0	0	3

Course Objectives: The objectives of the course are to make the students learn about

- To discuss different simplification methods for minimizing boolean functions
- To learn simplification of Boolean functions and their realization using logic gates.
- To gain knowledge on VHDL fundamentals, compilers, simulators and synthesis tools.
- To understand and design various combinational logic circuits.
- To study the design of sequential logic circuits in synchronous and asynchronous modes.
- To introduce programmable logic devices and to realize switching functions using

UNIT – I:

Logic Simplification and Combinational Logic Design: Review of Boolean Algebra and De Morgan's Theorem, SOP & POS forms, Canonical forms, Introduction to Logic Gates, Ex-OR, Ex-NOR operations, Minimization of Switching Functions: Karnaugh map method, Quine –McCluskey Tabular Minimization Method. Logic function realization: AND-OR, OR-AND and NAND/NOR realizations.

Learning Outcomes:

At the end of this unit, the student will be able to

- Apply basic laws & De Morgan's theorems to simplify Boolean expressions **L3**
- Compare K- Map&Q-M methods of minimizing logic functions **L5**

UNIT – II:

Introduction to Combinational Design 1: Binary Adders, Subtractors and BCD adder, Code converters - Binary to Gray, Gray to Binary, BCD to excess3, BCD to Seven Segment display.

The VHDL Hardware Description Language: Design flow, program structure, libraries and packages. Structural design elements, data flow design elements, behavioral design elements.

Learning Outcomes:

At the end of this unit, the student will be able to

- Apply Boolean algebra for describing combinational digital circuits **L3**
- Analyze standard combinational circuits such as adders, subtractors and code converters etc. **L4**
- Learn the Hardware Description Language (VHDL) **L1**

UNIT – III:

Combinational Logic Design 2: Decoders (3 to 8, octal to decimal), Encoders, Priority Encoders, Multiplexers, Demultiplexers, Comparators, Implementations of Logic Functions using Decoders and Multiplexers and their HDL models, HDL modeling of code converters. Multi-level implementation of multiplexer, demultiplexer , decoder, encoder.

Learning Outcomes:

At the end of this unit, the student will be able to

- Apply Boolean algebra for describing combinational digital circuits. **L3**
- Design and analyse various Combinational logic circuits. **L6**

UNIT – IV:

Sequential Logic Design: Latches, Flipflops, S-R, D, T, JK and Master-Slave JK FF, Edge triggered FF, flipflop conversions, set up and hold times, Ripple and Synchronous counters, Shift registers, and their HDL models.

Learning Outcomes:

At the end of this unit, the student will be able to

- Describe behaviour of Flip-Flops and Latches. **L1**
- Design sequential circuits using flip flops , registers and counters. **L6**

UNIT – V:

Finite state machines: Introduction to FSM, Moore and Mealy sequence detector and its HDL model.

Programmable Logic Devices: ROM, Programmable Logic Devices (PLDs), Introduction to logic families and their comparisons.

Learning Outcomes:

At the end of this unit, the student will be able to

- Describe functional differences between different types of memories (L1). **L1**
- Compare different types of Programmable Logic Devices (L2). **L4**

Text Books:

1. R.P. Jain, "Modern digital Electronics", Tata McGraw Hill, 4th edition, 2009.
2. J. Bhasker, "A VHDL Primer," 3rd Edition, Pearson Education/ PHI.

Reference Books:

1. Thomas L. Floyd, "Digital Fundamentals", Pearson, 11th edition, 2015.
2. Digital Design- Morris Mano, PHI, 4th Edition,2006

B.Tech II Year I Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

20AEC08 - SIGNALS AND SYSTEMS

L	T	P	C
3	0	0	3

Course Objectives: The objectives of the course are to make the students learn about

- To introduce terminology of signals and systems.
- To present Fourier tools through the analogy between vectors and signals.
- To teach concept of sampling and reconstruction of signals.
- To present linear systems in time and frequency domains.
- To teach Laplace and z-transform as mathematical tool to analyze continuous and discrete-time signals and systems.

UNIT – I:

Introduction: Definition of Signals and Systems, Classification and characteristics of Signals and Systems, related problems, Operations on signals. Complex exponential and sinusoidal signals, Singularity functions and related functions: impulse function, step function, signum function and ramp function. Analogy between vectors and signals, orthogonal signal space, Signal approximation using orthogonal functions, Mean square error, closed or complete set of orthogonal functions, orthogonally in complex functions.

Learning Outcomes:

At the end of this unit, the student will be able to

•Describe continuous time signal and discrete time signal **L2**

• State principles of vector spaces and concept of orthogonality **L1**

UNIT – II:

Fourier Series and Fourier Transform; Fourier series representation of continuous time periodic signals, properties of Fourier series, Dirichlet's conditions, Trigonometric and Exponential Fourier series, Complex Fourier spectrum. Deriving Fourier transform from Fourier series, Fourier transform of arbitrary signal, standard signals and periodic signals, properties of Fourier transforms, Fourier transforms involving impulse and Signum functions. Introduction to Hilbert Transform.

Learning Outcomes:

At the end of this unit, the student will be able to

- Identify system properties based on impulse response and Fourier analysis **L3**
- Analyze the spectral characteristics of signals **L4**

UNIT – III:

Sampling : Sampling theorem, graphical and analytical proof for band limited signals, impulse sampling, sampling with zero order hold, Nyquist criterion, reconstruction of signal from its samples, effect of under sampling – Aliasing, Introduction to Band Pass sampling.

Analysis of Linear Systems: Linear system, impulse response, response of a linear system, Linear time invariant (LTI) system, Linear time variant (LTV) system, Convolution: time domain, frequency domain and graphical representation. Transfer function of a LTI system.

Learning Outcomes:

At the end of this unit, the student will be able to

- Describe fundamentals of sampling (impulse modulation), including the implications of the sampling theorem (**L2**
- Illustrate signal sampling and its reconstruction **L2**

UNIT – IV:

Filter characteristics of linear systems, Distortion less transmission through a system, Signal bandwidth, system bandwidth, Ideal LPF, HPF and BPF characteristics, Causality and Poly-Wiener criterion for physical realization, relationship between bandwidth and rise time.

Correlation of signals: Cross-correlation and auto-correlation of functions, properties of correlation function, Energy density spectrum, Parseval's theorem, Power density spectrum, Relation between auto correlation function and energy/power spectral density function. Relation between convolution and correlation, Detection of periodic signals in the presence of noise by correlation, Extraction of signal from noise by filtering.

Learning Outcomes:

At the end of this unit, the student will be able to

- Compare and contrast the systems in time and frequency domain **L5**
- Determine relation between auto-correlation and Power density spectrum **L3**

UNIT – V:

Transform Techniques : Review of Laplace transforms, Partial fraction expansion, Inverse Laplace transform, Concept of region of convergence (ROC) for Laplace transforms, constraints on ROC for various classes of signals, Properties of Laplace transforms, Laplace transform of certain signals using waveform synthesis.

Discrete time signal representation using complex exponential and sinusoidal components , Concept of Z- Transform of a discrete sequence. Distinction between Laplace, Fourier and Z-transforms. Region of convergence in Z-Transform, constraints on ROC for various classes of signals, Inverse Z-transform, properties of Z-transforms.

Learning Outcomes:

At the end of this unit, the student will be able to

- Apply transform techniques to analyze discrete-time signals and systems **L3**
- Evaluate response of linear systems to known inputs by using Laplace transforms **L5**

Text Books:

1. B.P. Lathi, Signals, Systems & Communications, BS Publications, 2003.
2. A.V. Oppenheim, A.S. Willsky and S.H. Nawab, Signals and Systems PHI, 2nd Edition. 2009.

Reference Books:

1. Simon Haykin and Van Veen, Signals & Systems, Wiley, 2nd Edition.
2. John G. Proakis, Dimitris G. Manolakis, Digital Signal Processing, Principles, Algorithms,and Applications, 4 th Edition, PHI, 2007.
3. BP Lathi, Principles of Linear Systems and Signals Oxford University Press, 2015.

Course Outcomes:

At the end of this Course the student will be able to

• List different types of signals and systems	**L1**
• Identify system properties based on impulse response and Fourier analysis	**L3**
• Apply sampling theorem to convert continuous-time signals to discrete-time signal and reconstruct back	**L3**
• Classify systems based on their properties and determine the response of LTI system using convolution	**L4**
• Discuss relationships among the various representations of LTI systems	**L5**

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA
20AHS04 - MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS
(Common to all Branches)

L	T	P	C
3	0	0	3

Course Objectives:

- To inculcate the basic knowledge of micro economics and financial accounting.
- To make the students learn how demand is estimated for different products, input- output relationship for optimizing production and cost.

UNIT – I

Learning Outcomes:

At the end of this unit, the student will be able to

- Know the nature and scope of Managerial Economics and its importance. **L1**
- Understand the concept of demand and its determinants. **L2**

UNIT – II

Theory of Production: Production Function- Isoquants and Isocosts, MRTS, Cobb-Douglas Production function.

Cost Analysis: Cost concepts, Opportunity cost, Fixed Vs Variable costs, Explicit costs Vs. Implicit costs, Out of pocket costs vs. Imputed costs. Break even analysis -Determination of Break-Even Point (simple problems) - Managerial Significance and limitations of BEP.

Learning Outcomes:

At the end of this unit, the student will be able to

- Know the production function, Input-Output relationship and different cost concepts. **L1**
- Apply the least-cost combination of inputs. **L2**

UNIT – III

Introduction to Markets: Market structures: Types of competition, Features of Perfect Competition, Monopoly and Monopolistic Competition. Price-Output Determination under Perfect Competition, Monopoly, Monopolistic Competition.

Pricing Policies: Methods of Pricing-Marginal Cost Pricing, Limit Pricing, Market Skimming Pricing, Penetration Pricing, Bundling Pricing, and Peak Load Pricing. Internet Pricing Models: Flat rate pricing, Usage sensitive pricing, Transaction based pricing, Priority pricing, charging on the basis of social cost, Precedence model, Smart market mechanism model.

Learning Outcomes:

At the end of this unit, the student will be able to

- Apply the price output relationship in different markets. **L1**
- Evaluate price-output relationship to optimize cost, revenue and profit. **L2**

UNIT – IV

Types of Industrial Organization: Characteristic features of Industrial organization, Features and evaluation of Sole Proprietorship, Partnership, Joint Stock Company, State/Public Enterprises and their types.

Capital Budgeting: Introduction to capital, Meaning of capital budgeting, Need for capital budgeting – Capital budgeting decisions (Examples of capital budgeting) - Methods of Capital Budgeting: Payback Method, Accounting Rate of Return (ARR), IRR and Net Present Value Method (simple problems).

Learning Outcomes:

At the end of this unit, the student will be able to

- Know the concept of capital budgeting and its importance in business. **L1**
- Contrast and compare different investment appraisal methods. **L2**

UNIT – V

Introduction to Financial Accounting: Introduction to Double-entry system, Journal, Ledger, Trial Balance- Final Accounts (with simple adjustments) - Limitations of Financial Statements.

Interpretation and analysis of Financial Statement: Ratio Analysis – Liquidity ratios, Profitability ratios and solvency ratios – Preparation of changes in working capital statement and fund flow statement.

Learning Outcomes:

At the end of this unit, the student will be able to

- Know the concept, convention and significance of accounting. **L1**
- Apply the fundamental knowledge of accounting while posting the journal entries. **L2**

Text Books:

1. **J.V. Prabhakar Rao**: Managerial Economics and Financial Analysis, Maruthi Publications, 2011.
2. **Prof. C.Viswanatha Reddy:** 'Financial Accounting-1' Himalaya Publishing House, Newdelhi.

Reference Books:

1. **A R Aryasri** - Managerial Economics and Financial Analysis, TMH 2011.
2. **Suma damodaran**- Managerial Economics, **Oxford** 2011.
3. **S.A. Siddiqui & A.S. Siddiqui**, Managerial Economics and Financial Analysis, New Age International Publishers, 2011.
4. **N. Appa Rao. & P. Vijaya Kumar**: 'Managerial Economics and Financial Analysis', Cengage Publications, New Delhi, 2011.

Course Outcomes:

At the end of this Course the student will be able to

- Be able to perform and evaluate present worth, future worth and annual worth analyses on one of more economic alternatives. **L1**
- Be able to perform and evaluate payback period and capitalized cost on one or more economic alternatives. **L2**
- Be able to carry out and evaluate benefit/cost, life cycle and breakeven analyses on one or more economic alternatives. **L3**
- Evaluate the capital budgeting techniques. **L4**
- Students can analyze how to invest their capital and maximize returns. **L5**

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

20AHS05 - ENTERPRENUARSHIP AND INNOVATION MANAGEMENT

(Common to all Branches)

L	T	P	C
3	0	0	3

Course Objectives:

- To enable students understand the opportunities available to start a business.
- To impart knowledge about various sources of support (Financial and Non-financial) available to start an enterprise.

UNIT – 1: FUNDAMENTALS OF ENTREPRENEURSHIP

Fundamentals of Entrepreneurship – Evolution and Theories of Entrepreneurship – Characteristics of Entrepreneurs –Myths of Entrepreneurship – Kakinada Experiment -Elements of leadership –Role of Entrepreneurs in Indian economy – Social and Ethical Perspectives of Entrepreneurship - Corporate entrepreneurship – Social Entrepreneur, women Entrepreneurship - Opportunities & challenges.

Learning Outcomes:

At the end of this unit, the student will be able to

- Define entrepreneurship and the characteristics of an entrepreneur. **L1**
- Explain the significance of entrepreneurship in the economic development of a nation. **L2**

UNIT – II: IDEATION AND EVALUATION OF BUSINESS IDEAS

Opportunity identification – Ideations process - Sources of business ideas – Role of creativity – Sources of Innovation - Business Idea Evaluation - Product/ Service design – Design Thinking - Customer Value Proposition (CVP) – Business models.

Case study: Business cases of OYO, Paytm and Flipkart/ Smartmart.

Activity: Idea generation in groups and CVP.

Learning Outcomes:

At the end of this unit, the student will be able to

- Select the right business ideas. **L1**
- Explain the business idea evaluation process **L2**

UNIT – III: Business Organizations and Venture Establishment

Forms of business organisations/ownership – Techno-economic feasibility assessment – Financial feasibility – Market feasibility – Preparation of Business plan – Business canvas & Lean canvas – Challenges & Pitfalls in selecting new venture.

Activity: Preparation of business plan (draft).

Learning Outcomes:

At the end of this unit, the student will be able to

- Recall different forms of business organizations. **L1**
- Develop business canvas. **L2**

UNIT – IV: Introduction to Innovation

Creativity, Invention and innovation, Types of Innovation, Relevance of Technology for Innovation, The Indian innovations and opportunities.

Learning Outcomes:

At the end of this unit, the student will be able to

- Able to develop new ideas to discover new ways of looking problems and opportunities. **L1**
- Apply technology to innovation. **L2**

UNIT – V: Promoting and managing innovation

Innovators and Imitators, Patents, Trademarks, Intellectual Property, Exploring, Executing, Leveraging and renewing innovation, Enhancing Innovation Potential & Formulating strategies for Innovation.

Learning Outcomes:

At the end of this unit, the student will be able to

- Intellectual Property Licensing. **L1**
- Summarize the importance of IPR. **L2**

Text Books:

1. Robin Lowe and Sue Marriott, Enterprise: Entrepreneurship and Innovation Concepts, Contexts and Commercialization.
2. John Bessant and Joe Tidd, Innovation and Entrepreneurship.

Reference Books:

1. Rabindra N. Kanungo "Entrepreneurship and innovation", Sage Publications, New Delhi, 1998.
2. Peter F. Drucker, Innovation and Entrepreneurship.
3. EDII "Faculty and External Experts – A Hand Book for New Entrepreneurs Publishers: Entrepreneurship Development" Institute of India, Ahmadabad, 1986.
4. Philips, Bonefiel and Sharma (2011), Social Entrepreneurship, Global vision publishing house, New Delhi.

Course Outcomes:

At the end of this Course the student will be able to

- Choose entrepreneurship as an alternative career. **L1**
- Distinguish between corporate and social entrepreneurs. **L2**
- Examine and build customer value proposition. **L3**
- Analyze feasibility of business ideas. **L4**
- Compare various supports schemes provided by GOI. **L5**

B.Tech II Year I Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

20AEC05 - ELECTRONIC DEVICES AND CIRCUITS LABORATORY

L	T	P	C
1	0	4	3

Course Objectives: The objectives of the course are to make the students learn about

1. To verify the VI Characteristics of PN Junction Diode, Zener Diode, FET, SCR & UJT
2. To demonstrate the working of Half Wave and Full Wave Rectifiers without and with filters.
3. To analyze the characteristics of BJT and FET in various configurations.
4. Differentiate the working of BJT and FET as amplifier in various configurations.

List of Experiments: (Any 12 Experiments are to be conducted)

1. P-N Junction Diode Characteristics
2. Zener Diode as voltage regulator
3. Half Wave Rectifiers (without and with filter)
4. Full Wave Rectifiers (without and with filter)
5. CB Characteristics
6. CE Characteristics
7. CC Characteristics
8. FET Characteristics
9. SCR Characteristics
10. UJT Characteristics
11. CE Amplifier
12. CC Amplifier
13. FET-CS Amplifier
14. FET –CD Amplifier
15. Clippers
16. Clampers

Course Outcomes:

At the end of this Course the student will be able to

1.	Use PN Junction Diode, Zener Diode, FET, SCR & UJT for practical applications.	**L3**
2.	Demonstrate the working of Half wave & Full wave rectifiers without and with filters.	**L4**
3.	Analyze the characteristics of BJT and FET in various configurations.	**L4**
4.	Differentiate the working of BJT and FET as amplifier in various configurations	**L2**

B.Tech II Year I Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

20AEC07 - DIGITAL LOGIC AND DESIGN LAB

L	T	P	C
0	0	3	1.5

Course Objectives: The objectives of the course are to make the students learn about

1. To get the knowledge about functionality of various digital circuits(logicgates, adders, subtractors, converters, multiplexers and comparators.)
2. To use computer-aided design tools for development of complex digital logic circuits
3. To understand the functionality of various Digital ICs.

Note: Implement using digital ICs.

List of Experiments: (Any 4 Experiments are to be conducted)

1. Realization of Boolean Expressions using Gates
2. Design and realization of logic gates using universal gates
3. Generation of clock using NAND / NOR gates
4. Design a 4 – bit Adder / Subtractor
5. Design and realization of a 4 – bit Gray to Binary and Binary to Gray Converter
6. Design and realization of 8x1 MUX using 2x1 MUX
7. Design and realization of 4 bit comparator

List of Experiments: (Any 8 Experiments are to be conducted)

Write a VHDL code to Simulate and synthesize the following in Gate level, Data flow and Behavioral Modeling styles.

1. Logic Gates.
2. Adders and Subtractors.
3. Multiplexers and De-multiplexers.
4. Encoders, Decoders, Comparator.
5. Implementation of logic function using Multiplexers and Decoders.
6. Arithmetic and Logic Unit.
7. Flip-Flops.
8. Up, Down and UP/Down Counters.
9. Sequence Detector using Mealy and Moore type state machines.

Course Outcomes:

At the end of this Course the student will be able to

1. Understand the functionality of various digital circuits **L2**
2. Use computer-aided design tools for development of digital logic circuits **L3**
3. Learn the functionality of various Digital ICs **L1**

B.Tech II Year I Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

20AEC09 - SIGNALS AND SYSTEMS LAB

L	T	P	C
0	0	3	1.5

Course Objectives: The objectives of the course are to make the students learn about

1. To provide practical exposure to generate and simulate basic signals.
2. To analyze signals and sequences using Fourier, Laplace and Z-transforms.
3. To write programs for signal processing applications.

List of Experiments (All the experiments are to be simulated using MATLAB or equivalent software)

1. Write a program to generate various Signals and Sequences
2. Write a program to perform operations on Signals and Sequences
3. Write a program to find the trigonometric & exponential Fourier series coefficients of a rectangular periodic signal and reconstruct the signal.
4. Write a program to find Fourier transform of a given signal. Write a program to convolve two discrete time sequences.
5. Write a program to find autocorrelation and cross correlation of given sequences.
6. Write a program to verify Linearity and Time Invariance properties of a given Continuous/Discrete System.
7. Write a program to generate discrete time sequence.
8. Write a program to find magnitude and phase response of first order low pass and high pass filter.
9. Write a program to find response of a low pass filter and high pass filter, when a speech signal is passed through these filters.
10. Write a program to generate Complex Gaussian noise and find its mean, variance, PDF and PSD.
11. Generate a Random data (with bipolar) for a given data rate .
12. To plot pole-zero diagram in S-plane / Z-plane of given signal/sequence and verify its stability

Course Outcomes:

At the end of this Course the student will be able to

1. Generate signals and sequences to the systems to perform various operations **L3**
2. Analyse signals using Fourier, Laplace and Z-transforms **L4**
3. Write programs for signal processing applications **L6**

B.Tech II Year I Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

20ACS13-DATA STRUCTURES AND PYTHON PROGRAMMING

(ECE)

L	T	P	C
1	0	2	1.5

Course Objectives:

- To introduce different data structures for solving the problems.
- To demonstrate modeling the given problem as a graph
- To use iterations and generators.
- To test objects and handle changing requirements.

UNIT – I: STACKS, QUEUES AND LINKED LIST **8hrs**

Introduction: Stacks, Queues, Circular Queues Using Dynamic Arrays, Evaluation of Expressions, Multiple Stacks and Queues. Linked lists: Singly Linked Lists, Additional List Operations, Doubly Linked Lists.

Learning Outcomes:

At the end of this unit, the student will be able to

- To understand why Python is a useful scripting language for developers **L1**
- To learn how to design and program Python applications. **L1**

UNIT – II: SEARCHING AND SORTING TECHNIQUES & TREE **8hrs**

Searching and Sorting Techniques: Linear and Binary search, Insertion, selection, quick, merge, and bubble sort.

Trees: Binary Trees, Binary Tree Traversals, Additional Binary Tree Operations, Binary Search Trees, Heap Tree.

Learning Outcomes:

At the end of this unit, the student will be able to

- To learn how to use lists, tuples, and dictionaries in Python programs **L2**
- To learn how to identify Python object types **L2**
- To learn how to use indexing and slicing to access data in Python programs **L2**

UNIT – III: GRAPHS AND HASHING **8hrs**

Graphs: The graph abstract data type, Elementary graph operations, Minimum cost spanning trees, transitive closure.

Hashing: Introduction, Static hashing, dynamic hashing.

Learning Outcomes:

At the end of this unit, the student will be able to

- To learn how to write loops and decision statements in Python **L3**
- To learn how to write functions and pass arguments in Python **L3**

UNIT – IV: INTRODUCTION, DATA TYPES EXPRESSIONS AND CONTROL STRUCTURES **7 Hrs**

Introduction, Data Types and Expressions: The Python programming language, First program in Python, Literals, Variables and Identifiers, Operators, Expressions and Data types.
Control Structures: Control structures, Boolean expressions, Selection control and Iterative control.

Learning Outcomes:

At the end of this unit, the student will be able to

• To learn how to build and package Python modules for reusability	**L3**
• To learn how to read and write files in Python	**L3**
• To learn how to design object□oriented programs with Python classes	**L3**

UNIT – V: LISTS, DICTIONARIES,TUPLES AND SETS

Lists: List structures, Lists in Python, Iterations over lists, Assigning and copying lists, List comprehensions.
Dictionaries, Tuples and Sets: Dictionary types in Python, Implementation of Dictionary, Tuples, Set data type - the Set data type in Python, Implementation of sets.
Design With Functions : Program routines, Functions, Recursion-Recursive functions,

Learning Outcomes:

At the end of this unit, the student will be able to

• To learn how to use class inheritance in Python for reusability	**L4**
• To learn how to use exception handling in Python applications for error handling	**L5**

Text Books:

1. **"The Complete Reference C":** Fourth Edition Herbert Schildt Osborne/McGraw-Hill.
2. Charles Dierbach, Introduction to Computer Science using Python: A Computational Problem-Solving Focus, Wiley India Edition, 2016
3. "C Programming and Data Structures", by E. Balaguruswamy, McGraw-Hill.
4. "Data Structures using C", by Reema Thareja, 2nd Edition, OXFORD Press.
5. "Fundamentals of Data Structures in C", Horowitz, Sahni, Anderson-freed, 2nd Edition, 2011, Universities Press.
6. Mark Lutz, "Programming Python," O'Reilly Publications, Fourth Edition, 2011.

Reference Books:

1. RS Bichkar "Programming with C", 2012, Universities Press.
2. Pelin Aksoy, and Laura Denardis, "Information Technology in Theory", 2017, Cengage
3. Byron Gottfried and Jitender Kumar Chhabra, "Programming with C", 4th Edition, 2019,McGraw Hill Education.
4. Kenneth Lambert and B.L. Juneja, *Fundamentals of Python,* Cengage Learning, Third Edition, 2012.

Course Outcomes:

At the end of this Course the student will be able to

• Develop the applications using stacks and queues.	**L2**
• Evaluate Expressions & Construct the linked list for various applications	**L3**
• Compare different searching, sorting and tree structures.	**L3**

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

20AHS03 - UNIVERSAL HUMAN VALUES

(Common to all branches)

L	T	P	C
3	0	0	0

Course Objectives:

- Exposure to the value of life, society and harmony.
- Leading towards holistic perspective based on self-exploration about themselves (human being), family, and society and nature/existence.
- Bringing transition from the present state to Universal Human Order.
- Instill commitment and courage to act.
- Know about appropriate technologies and management patterns.

UNIT –I : HUMAN VALUES **12 Hrs**

Importance of UHV- Morals-Values –Ethics- definitions and differences-Integrity-Work Ethic-Service learning –Respect for others –Caring and Sharing – Honesty – self confidence-Courage-Co Operation –Commitment – Empathy –Character-Spirituality- Moral dilemmas.

Learning Outcomes:

At the end of this unit, the student will be able to

Understand the concept of morals, Ethics. **L1**

Able to analyse Moral dilemmas. **L2**

UNIT – II: PERSONALITY DEVELOPMENT **12 Hrs**

Concept Of Personality- Types-Determinants-Intrapersonal Skills-meaning-types- Techniques - Interpersonal Skills- meaning-types- Techniques-SWOT Analysis -Building Right Attitude.-Communication skills-Non Verbal Communication skills.

Learning Outcomes:

At the end of this unit, the student will be able to

Analysing SWOT. **L1**

Knowing about self personality. **L2**

UNIT – III : ENGINEERING AS EXPERIMENTATION **12 Hrs**

Engineering as an Experimentation-Engineers as Responsible Experimenters -Codes Of Ethics and Industrial Standards-Case Study: The Challenger-Confidentiality-Conflicts of Interests-Risk and Analysis methods-Safety and Safety Measures.

Learning Outcomes:

At the end of this unit, the student will be able to

Understand the concept of Ethics in industry. **L1**

Able to assesment safety standards. **L2**

UNIT – IV : FAMILY AND SCOCIETY **12 Hrs**

Family -Importance –Types-Functions-Influences and generation gap- Premarital counseling-Good family-Characteristics-Building a healthy family- Parents and Children -Honouring Parents-Society Definition—Types-Roles-Responsibilities-Social Evils-reasons-remedies.

Learning Outcomes:

At the end of this unit, the student will be able to

Development of a holistic perspective based on self-exploration about themselves. **L1**

Strengthening of self-reflection. **L2**

UNIT – V : GLOBAL ISSUES **12 Hrs**

Globalization: Globalization-MNCs-Technology-Cross culture issues- Environmental Ethics-Disasters- global pandemics-Computer Ethics and Net Etiquettes -Human and Employee Rights-Weapons Development -Ethics and Research-Intellectual Property Rights(IPR).

Learning Outcomes:

At the end of this unit, the student will be able to

Understand various cross culture issues. **L1**

Identifying Employee Rights. **L2**

Text Books:

1. **"Engineering Ethics" by Harris, Pritchard and Rabins, CENGAGE Learning, India Edition, 2009.**
2. **Engineering Ethics includes Human Values" by M.Govindarajan, S.Natarajan and V.S.SenthilKumar-PHI Learning Pvt. Ltd-2009.**
3. **"Ethics in Engineering" by Mike W. Martin and Roland Schinzinger – Tata McGrawHill– 2003.**
4. **"Professional Ethics and Morals" by Prof.A.R.Aryasri, Dharanikota Suyodhana Maruthi Publications.**
5. **"Professional Ethics and Human Values" by A.Alavudeen, R.Kalil Rahman and M.Jayakumaran- Laxmi Publications.**

Reference Books:

1. **"Indian Culture, Values and Professional Ethics" by PSR Murthy-BS Publication.**
2. **"Professional Ethics and Human Values" by Prof.D.R.Kiran.**

Course Outcomes:

At the end of this Course the student will be able to

- Define terms like Natural Acceptance, Happiness and Prosperity. **L1**
- Know about appropriate technologies and management patterns Understand awareness of oneself, and ones surroundings (family, society, nature). **L2**
- Apply what they have learnt to their own self in different day-to-day settings in real life. **L3**
- Relate human values with human relationship and human society. **L4**
- Justify the need for universal human values and harmonious existence. **L5**

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

II Year B.Tech. II-Sem (R20)

20ABS16 - PROBABILITY THEORY & RANDOM PROCESS

(ECE)

L	T	P	C
3	0	0	3

Course Objectives:

- To gain the knowledge of the basic probability concepts and acquire skills in handling situations (L3)
- Involving more than one random variable and functions of random variables. (L3)
- To understand the principles of random signals and random processes. (L2)
- To be acquainted with systems involving random signals. L(3)
- To gain knowledge of standard distributions that can describe real life phenomena. (L4)

UNIT – 1:Probability theory and Random Variable:

Probability Introduced Through Sets and Relative Frequency: Experiments and SampleSpaces, Discrete and Continuous Sample Spaces, Events, Probability Definitions and Axioms, Mathematical Model of Experiments, Probability as a Relative Frequency.

Joint and Conditional Probability, Total Probability, Bayes' Theorem, Independent Events, Problem Solving.

Random Variable: Definition of a Random Variable, Conditions for a Function to be a Random Variable, Discrete, Continuous and Mixed Random Variable, Distribution and Density functions, Properties, Expectation, Binomial, Poisson, Uniform, Gaussian, Exponential, Rayleigh, Conditional Distribution, Methods of defining Conditioning Event, Conditional Density, Properties, Problem Solving.

Learning Outcomes:

At the end of this unit, the student will be able to

• Understand the fundamental concepts of probability theory, random variables, and conditional probability.	**L2**
• Evaluate the different probability distribution and density functions.	**L3**

UNIT – II: Operations on Single Random Variable and Multiple Random Variables:

Operations on Single Random Variable: Introduction, Expectation of a random variable, Moments-moments about the origin, Central moments, Variance and Skew, Chebyshev's inequality, moment generating function, characteristic function, transformations of random variable.

Multiple Random Variables: Vector Random Variables, Joint Distribution Function, Properties of Joint Distribution, Marginal Distribution Functions, Conditional Distribution and Density – Point Conditioning, Interval conditioning, Statistical Independence, Sum of Two RandomVariables, Sum of Several Random Variables, Central Limit Theorem (without Proof), Equal and Unequal Distributions.

Learning Outcomes:

At the end of this unit, the student will be able to

• Apply the knowledge to the sum of random variables, central limit theorem in communication system	**L3**
• Evaluate the single and multiple random variable concepts to expectation, variance and moments.	**L3**

UNIT – III: Operations on Multiple Random Variables and Jointly Gaussian Random Variables:

Operations on Multiple Random Variables: Expected Value of a Function of Random Variables, Joint Moments about the Origin, Joint Central Moments, Joint Characteristic Functions,

Jointly Gaussian Random Variables: Two Random Variables case, N Random Variable case, Properties of Gaussian random variables, Transformations of Multiple Random Variables.

Learning Outcomes:

At the end of this unit, the student will be able to

• Apply the different operations to multiple random variables	**L3**
• Understand the concepts of linear transformation of Gaussian random variables	**L2**

UNIT – IV: Random Processes-Temporal Characteristics, Stationary and Independency and Correlation Functions:

Random Processes-Temporal Characteristics: The Random Process Concept, Classification of Processes, Deterministic and Nondeterministic Processes.

Stationary and Independency: Distribution and Density Functions. Concept of Stationarity and Statistical Independence, First-Order Stationary Processes, Second- Order and Wide-Sense Stationarity, N-Order and Strict-Sense Stationarity. Time Averages and Ergodicity, Mean-Ergodic Processes, Correlation-Ergodic Processes.

Correlation Functions: Autocorrelation Function and Its Properties, Cross-Correlation Function and its Properties, Covariance Functions, Gaussian Random Processes, Poisson Random Process.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand and analyze continuous and discrete-time random processes. **L3**
- Analyze the concepts and its properties of auto correlation, cross correlation functions and power spectral density **L3**

UNIT – V: Random Processes-Spectral Characteristics:

The Power Density Spectrum and its Properties: The Power Density Spectrum, properties of the Power Density Spectrum, Bandwidth of the Power Density spectrum, Relationship between Power Spectrum and Autocorrelation Function.

The Cross-Power Density Spectrum and its Properties: Cross-Power Density Spectrum, Properties of Cross-Power Density Spectrum, Relationship between Cross-Power Spectrum and Cross-Correlation Function.

Learning Outcomes:

At the end of this unit, the student will be able to

- Analyze the concepts and its properties of Power Density Spectrum, Bandwidth of the Power Density spectrum. **L3**
- Analyze the concepts and its properties of Cross-Power Density Spectrum and establish the relationship between Cross-Power Spectrum and Cross-Correlation Function. **L3**

Text Books:

1. Peyton Z. Peebles, "Probability, Random Variables & Random Signal Principles", 4th Edition, TMH, 2002.
2. Athanasios Papoulis and S. Unnikrishna Pillai, "Probability, Random Variables and Stochastic Processes", 4th Edition, PHI, 2002.

Reference Books:

1. Simon Haykin, "Communication Systems", 3rd Edition, Wiley, 2010.
2. Henry Stark and John W.Woods, "Probability and Random Processes with Application to Signal Processing," 3rd Edition, Pearson Education, 2002.
3. George R. Cooper, Clave D. MC Gillem, "Probability Methods of Signal and System Analysis," 3rd Edition, Oxford, 1999.
4. Sp Eugene Xavier, "Statistical Theory of Communication", New Age International, 2008.

Course Outcomes:

At the end of this Course the student will be able to

- Understanding the concepts of Probability, Random Variables, Random Processes and their characteristics **L1**
- Learn how to deal with multiple random variables, conditional Probability, joint distribution and statistical independence. **L2**
- Formulate and solve the engineering problems involving random variables and random Processes. **L3**
- Analyze various probability density functions of random variables. **L4**
- Analyze the concepts and its properties of Power Density Spectrum, Bandwidth of the Power Density spectrum. **L3**

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B.Tech II Year II Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

20ECE10- ELECTRONIC CIRCUIT ANALYSIS AND DESIGN

L	T	P	C
3	0	0	3

Course Objectives: The objectives of the course are to make the students learn about

1. To gain the knowledge of analysis of BJT amplifiers at high frequencies.
2. To study about the multistage amplifiers and their performance characteristics.
3. To understand the effect of negative feedback on amplifier characteristics.
4. To learn the basic principles and working of oscillator circuits.
5. To get a basic idea about large signal amplifiers and tuned amplifiers.

UNIT – I:

Multistage Amplifiers: Classification of Amplifiers- Distortion in amplifiers, Analysis of CE amplifier with Emitter Resistance and Emitter follower, Different Coupling Schemes used in Amplifiers – RC Coupled Amplifier, Direct and Transformer Coupled Amplifiers, Frequency Response of BJT Amplifier, Design of Single stage RC Coupled Amplifier Using BJT, Analysis of Cascaded RC Coupled BJT Amplifiers, Darlington Pair, Cascode Amplifier, Illustrative problems.

Learning Outcomes:

At the end of this unit, the student will be able to

- Analyse the inter-stage coupling and performance parameters of multistage amplifiers. **L4**
- Design multiple stage amplifier circuits **L6**

UNIT – II:

High Frequency Analysis of BJT and FET: Logarithms, Decibels, General Frequency considerations, Analysis of BJT amplifiers at High Frequencies, Effect of Coupling and bypass Capacitors, The Hybrid-pi (π)- Common Emitter Transistor Model, CE short Circuit Current gain, Current gain with Resistive Load, Single Stage CE Transistor Amplifier response, Gain-Bandwidth Product, FET model at high frequency, Common drain amplifier at high frequencies, Illustrative design problems.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand the concepts and equivalent circuit models of BJT at high frequencies **L2**
- Analyze high frequency models and performance parameters of BJT amplifier circuits **L4**

UNIT – III:

Feedback Amplifiers: Concepts of Feedback, Classification of Feedback Amplifiers, General Characteristics of Negative Feedback Amplifiers, Effect of Feedback on Amplifier characteristics, Voltage Series, Voltage Shunt, Current Series and Current Shunt Feedback Configurations, Illustrative design Problems.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand the concept of feedback and determine its on amplifier characteristics **L2**
- Analyse the characteristics of various types of feedback configurations **L4**

UNIT – IV:

Oscillators: Conditions for Oscillations, RC and LC type Oscillators, RC-Phase shift and Wien-Bridge Oscillators, Generalized Analysis of LC Oscillators, Hartley and Colpitts Oscillators, Crystal Oscillators, Frequency and Amplitude Stability of Oscillators, Illustrative design problems.

Regulators: Emitter follower type regulator, Transistorized series and shunt regulator, IC Voltage regulator

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand the basic working principle of oscillator. **L2**
- Analyse different types of oscillators circuits **L4**

UNIT – V:

Power Amplifiers: Classification, Series fed Class A Power Amplifier, Transformer Coupled Class A Amplifier, Efficiency, Push Pull Amplifier- Complementary Symmetry Class-B Power Amplifier, Amplifier Distortion, Power Transistor Heat sinking, Class C and Class D Power amplifiers, Illustrative design problems.

Introduction to Tuned amplifiers: Q-Factor, Single tuned, double tuned and stagger tuned amplifiers.

Learning Outcomes:

At the end of this unit, the student will be able to

- Know about common classes of power amplifier and their basic characteristics . **L1**
- Evaluate the resonant frequency and analyse the characteristics of tuned amplifiers. **L5**

Text Books:

1. Integrated Electronics, Jacob Millman, Christos C Halkias, 2nd Edition, Mc Graw Hill, 2002.
2. Electronic Devices and Circuit Theory, Robert L.Boylestad, Louis Nashelsky, 9th Edition, Pearson, 2008.

Reference Books:

1. Electronic Circuit Analysis, K.Lal Kishore, 2nd Edition, BSP, 2004.
2. Electronic Circuits Analysis and Design, Donald A Neamen, 3rd Edition, Tata McGraw-Hill, 2009.
3. Microelectronic circuits, Sedra, Kenneth, Smith, 5th Edition, Oxford University Press, 2011.
4. Electronic Circuit and Applications, Mohammad H. Rashid, 3rd Edition, CENGAGE Learning, 2009.
5. Introductory Electronic Devices and Circuits, Robert T. Paynter, 7th edition, PEI, 2009.

Course Outcomes:

At the end of this Course the student will be able to

1. Summarize the high frequencies analysis of BJT amplifiers. **L2**
2. Analyse the performance characteristics of multistage amplifiers. **L4**
3. Understand the effect of negative feedback on amplifier characteristics. **L2**
4. Correlate the basic principles and working of oscillator circuits **L4**
5. Compare different types of power amplifiers and tuned amplifiers **L2**

B.Tech II Year II Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

20ECE12 - EM WAVES AND TRANSMISSION LINES

L	T	P	C
3	0	0	3

Course Objectives: The objectives of the course are to make the students learn about

1. To understand and analyze different laws and theorems of electrostatic fields.
2. To study and analyze different laws and theorems of magneto static fields.
3. To analyze Maxwell's equations in different forms.
4. To learn the concepts of wave theory and its propagation through various mediums.
5. To get an exposure to the properties of transmission lines.

UNIT – I:

Electrostatics: Review of Vector algebra, Co-ordinate systems & transformation, Vector calculus, Coulomb's Law, Electric Field Intensity – Fields due to Different Charge Distributions, Electric Flux Density, Gauss Law and Applications, Electric Potential, Relations Between E and V, Maxwell's Two Equations for Electrostatic Fields, Electric dipole, Energy Density, Convection and Conduction Currents, Dielectric Constant, Continuity Equation, Relaxation Time, Poisson's and Laplace's Equations, Capacitance – Parallel Plate, Coaxial, Spherical Capacitors, Illustrative Problems.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand vector algebra, vector calculus and concepts related to electrostatic Fields. **L2**
- Analyze and solve the problems related to electrostatic fields. **L4**

UNIT – II:

Magneto statics: Biot-Savart Law, Ampere's Circuital Law and Applications, Magnetic Flux Density, Maxwell's Two Equations for Magneto static Fields, Magnetic Scalar and Vector Potentials, Forces due to Magnetic Fields, Magnetic torque and moment, Magnetic dipole, Inductances and Magnetic Energy, Illustrative Problems.

Learning Outcomes:

At the end of this unit, the student will be able to

- Comprehend the laws, concepts and proofs related to Magnetostatic Fields. **L2**
- Analyze and solve the problems related to magnetic fields. **L4**

UNIT – III:

Maxwell's Equations : Faraday's Law and Transformer e.m.f, Inconsistency of Ampere's Law and Displacement Current Density, Maxwell's Equations in Different Final Forms and Word Statements. Boundary Conditions of Electromagnetic fields: Dielectric-Dielectric and Dielectric-Conductor Interfaces, Illustrative Problems.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand the significance and utility of Maxwell's Equations. **L2**

Appreciate the importance of boundary conditions in electromagnetics. **L3**

UNIT – IV:

EM Wave Characteristics : Wave Equations for Conducting and Perfect Dielectric Media, Uniform Plane Waves ,All Relations between E & H, Sinusoidal Variations, Wave Propagation in Lossless and Conducting Media, Wave Propagation in Good Conductors and Good Dielectrics, Skin depth, physical significance of Skin Depth, Reflection and Refraction of Plane Waves – Normal and Oblique Incidences, for both Perfect Conductor and Perfect Dielectrics, Brewster Angle, Critical Angle and Total Internal Reflection, Surface Impedance, Poynting Vector and Poynting Theorem – Applications, Illustrative Problems.

Learning Outcomes:

At the end of this unit, the student will be able to

- Learn about the characteristics of Uniform Plane Waves (UPW). **L1**
- Understand the propagation of electromagnetic waves in different media. **L2**

UNIT – V:

Transmission Lines: Types, Transmission line parameters (Primary and Secondary), Transmission line equations, Input impedance, Standing wave ratio & power, Smith chart & its applications, Applications of transmission lines of various lengths, Basics of waveguides. Illustrative Problems.

Learning Outcomes:

At the end of this unit, the student will be able to

- Determine the basic transmission line equations and their characteristics **L3**
- Understand the smith chart and its applications. **L2**

Text Books:

1. Elements of Electromagnetics, Matthew N.O. Sadiku, 4th Edition, Oxford University Press, 2008.
2. Electromagnetic Waves and Radiating Systems, E.C. Jordan and K.G. Balmain, 2nd Edition, PHI, 2000.

Reference Books:

1. Electromagnetic Field Theory and Transmission Lines, G. S. N. Raju, 2nd Edition, Pearson Education, 2013.
2. Engineering Electromagnetics, William H. Hayt Jr. and John A. Buck, 7th Edition, Tata McGraw Hill, 2006.
3. Electromagnetics, John D. Krauss, 3rd Edition, McGraw Hill, 1988.
4. Networks, Lines, and Fields, John D. Ryder,2nd Edition, PHI publications, 2012.

Course Outcomes:

At the end of this Course the student will be able to

1. Analyze and apply the laws & theorems of electrostatic fields to solve the related problems. **L4**
2. Gain proficiency in the analysis and application of magneto static laws and theorems. **L4**
3. Analyze Maxwell's equations in different forms. **L4**
4. Learn the concepts of wave theory and its propagation through various mediums. **L1**
5. Understand the properties of transmission lines and their applications. **L2**

B.Tech II Year II Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

20ECE13 - ANALOG COMMUNICATIONS

L	T	P	C
3	0	0	3

Course Objectives: The objectives of the course are to make the students learn about

1. To gain an understanding of basics of analog communication systems, various amplitude modulation and demodulation techniques
2. To study different types of angle modulation and demodulation schemes.
3. To learn and analyze the effects of noise for different modulation techniques.
4. To understand different pulse modulation schemes, radio transmitters and receivers
5. To acquire the knowledge about information theory and channel coding.

UNIT – I:

Introduction: Elements of communication systems, Information, Messages and Signals, Modulation, Modulation Methods, Modulation Benefits and Applications.

Amplitude Modulation & Demodulation : Baseband and carrier communication, Amplitude Modulation (AM), Side band and carrier power of AM, Generation of amplitude modulated wave-square law Modulator, switching Modulator, Demodulation of AM Waves- Envelope detector, Rectifier detector, Suppressed carrier Modulation, Double sideband suppressed carrier (DSB-SC) Modulation, Generation of DSB-SC signals- Balanced Modulator, Ring Modulator, Demodulation of DSB-SC signals- Synchronous detector, Quadrature amplitude modulation (QAM), Single side band suppressed carrier (SSB-SC) Modulation, Generation of SSB-SC signals-Frequency & Phase discrimination methods, Demodulation of SSB-SC signals- Synchronous detector, Vestigial sideband (VSB) modulation & demodulation, Frequency mixer.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand the basic concepts of the analog communication systems **L2**
- Appreciate the uses and applications of different amplitude modulation and demodulation techniques. **L3**

UNIT – II:

Angle Modulation & Demodulation: Concept of instantaneous frequency, Generalized concept of angle modulation, Bandwidth of angle modulated waves – Narrow band frequency modulation (NBFM); and Wide band FM (WBFM), Phase modulation, Features of angle modulation, Generation of FM waves – Indirect method, Direct generation; Demodulation of FM, Band pass limiter, Practical frequency demodulators, Power Spectral density, Pre-emphasis & De-emphasis filters, FM receiver, FM Capture Effect, Illustrative Problems.

Learning Outcomes:

At the end of this unit, the student will be able to

- Learn the concepts of frequency modulation and phase modulation. **L1**
- Compare NBFM and WBFM, analyze FM and PM. **L2**

UNIT – III:

Noise in Communication Systems: Thermal noise, Properties of Thermal Noise, Time domain representation of narrowband noise, Filtered white noise, Quadrature representation of narrowband noise, Envelope of narrowband noise plus sine wave, Signal to noise ratio & probability of error, Noise equivalent bandwidth, Effective noise temperature, and Noise figure, Baseband systems with channel noise, Performance analysis of AM, DSB-SC, SSB-SC, FM, PM in the presence of noise, Illustrative Problems.

Learning Outcomes:

At the end of this unit, the student will be able to

- Know about different types of noise and their effects **L1**
- Analyze the performance of different modulation methods in the presence of noise **L4**

UNIT – IV:

Analog pulse modulation schemes: Pulse amplitude modulation (PAM) & demodulation, Pulse-Time Modulation – Pulse Duration and Pulse Position modulations, and demodulation schemes, Illustrative Problems.

Radio Transmitters and Receivers: AM Transmitter, FM Transmitter, Super-heterodyne AM and FM receiver, Sensitivity, Selectivity, Image rejection ratio and fidelity.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand different types of analog pulse modulation methods. **L2**
- Gain knowledge on radio transmitters and receivers. **L1**

UNIT – V:

Information Theory & Channel Coding: Introduction, Information content of message, Entropy, Entropy of symbols in long independent and dependent sequences, Entropy and information rate of Mark off sources, Shannon's encoding algorithm, Huffman coding, Discrete communication channels, Rate of information over a discrete channel, Capacity of discrete memory less channels, Discrete channels with memory, Shannon – Hartley theorem and its implications, Illustrative problems.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand the concepts of information theory and coding techniques. **L2**
- Derive the channel capacity and design the channel performance. **L3**

Text Books:

1. Simon Haykin, "Communication Systems", 3rd edition, Wiley-India edition, 2010.
2. B. P. Lathi, "Modern Digital and Analog Communication Systems," 3rd Edition, Oxford Univ. press, 2006.
3. A. Bruce Carlson, & Paul B. Crilly, "Communication Systems – An Introduction to Signals & Noise in Electrical Communication", 5th Edition, McGraw-Hill International Edition, 2010.

Reference Books:

1. Herbert Taub, Donald L Schilling, "Principles of Communication Systems", 3rd Edition, Tata McGraw-Hill, 2009.
2. George Kennedy, Bernard Davis, "Electronics & Communication System", 3rd Edition, Tata McGraw Hill, 2004.

Course Outcomes:

At the end of this Course the student will be able to

1. Understand the basics of analog communication systems, various amplitude modulation and demodulation techniques. **L2**
2. Compare different types of angle modulation and demodulation schemes **L2**
3. Analyze the effects of noise for different modulation techniques **L4**
4. Summarize different pulse modulation schemes, radio transmitters and receivers **L5**
5. Understand the concepts of information theory and channel coding . **L2**

B.Tech II Year II Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

20ECE15 - LINEAR AND DIGITAL INTEGRATED CIRCUITS

L	T	P	C
3	0	0	3

Course Objectives: The objectives of the course are to make the students learn about

1. To study differential amplifiers and their characteristics, characteristics of Op-amp and its applications.
2. To understand the operation of op-amp with negative feedback and its frequency response.
3. To design and analyze amplifiers, filters and converters
4. To develop oscillators and Multivibrators using Linear IC's.
5. To learn about various techniques to design A/D and D/A convertors.

UNIT – I:

Operational Amplifiers: Introduction to IC Technology, Basic BJT Differential Amplifiers and its qualitative description, Differential amplifier configurations , Ideal Op-Amp, Equivalent circuit, Voltage Transfer curve, open loop op-amp configurations, Introduction to dual OP-AMP TL082 as a general purpose JFET-input Operational Amplifier. Closed loop op-amp configurations: Inverting, non-inverting and differential amplifiers, properties of Practical op-amp.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand the differential amplifiers and their characteristics **L2**
- Analyze the linear and non-linear applications of operational amplifiers **L4**

UNIT – II:

Frequency Response of Op-Amp: Introduction, compensating networks, frequency response of internally compensated op-amps and non-compensated op-amps, High frequency op-amp equivalent circuit, open loop vs close loop frequency response, circuit stability, slew rate.

OP-AMP Applications-1: Summing, scaling and averaging amplifiers, voltage to current converter, current to voltage converter, integrator, differentiator, active filters, First and Second order Butterworth filter and its frequency response

Learning Outcomes:

At the end of this unit, the student will be able to

- Learn the feedback configurations of OP-AMP **L1**
- Explain the frequency response of op-amp circuits **L3**

UNIT – III:

OP-AMP Applications-2 : Phase shift and Wien bridge oscillators, square, triangular and sawtooth wave generators, comparators, Zero crossing detector.

Specialized IC Applications: IC555 Timer Block Schematic, Functional Diagram, applications of IC555 Timer - Monostable and Astable Operations, VCO - 566, PLL - 565.

Analog to Digital and Digital to Analog Converters: D/A Converters - R-2R ladder type, Voltage Mode and Current Mode R-2R ladder types, High speed sample and hold circuits, A/D Converters - Flash type, Successive Approximation type, Single slope type, Dual slope type, A/D Converter using Voltage to Time Conversion.

Learning Outcomes:

At the end of this unit, the student will be able to

- Design and analyze different amplifiers using op-amp **L6**
- Understand the working of converters and filters using op-amp **L2**

UNIT – IV:

Combinational Logic Design: Decoders (74x138), Dual Decoder (74x139), 8 to 3 Encoders, Priority Encoder (74x148), three state devices, multiplexers (74x151) and de-multiplexers (74x155), Code Converters, EX-OR gates and parity circuits, comparators (74x85), adders & subtractors, ALUs, Combinational multipliers, Design considerations of the above-mentioned combinational logic digital IC's, VHDL models for the above ICs.

Learning Outcomes:

At the end of this unit, the student will be able to

- Design oscillators using op-amps **L6**
- Analyze the design and working of Multivibrators and PLL's using timer IC **L4**

UNIT – V:

Sequential logic Design: Latches & flip flops, counters (74x163), shift register (74x164 and 74x166) and PLDs. Design considerations of the above-mentioned sequential logic digital IC's, VHDL models for the above ICs. Design process of FSM: Moore and Mealy machines and their VHDL models, Synchronous design methodology and it's impediments.

Learning Outcomes:

At the end of this unit, the student will be able to

- Learn the techniques for designing Digital to Analog Converters **L1**
- Implement Analog to Digital Converters in different methods **L5**

Text Books:

1. D. Roy Chowdhury, "Linear integrated circuits", 2nd Edition, New Age International (P) Ltd, 2003.
2. Ramakanth A.Gayakwad,"Op-amps and Linear ICs", 4th Edition, PHI, 1987.
3. TL082 Data sheet: http://www.ti.com/lit/ds/symlink/tl082.pdf
4. John F. Wakerly, "Digital Design Principles & Practices," 3rd Edition, PHI/ Pearson Education Asia, 2005.

Reference Books:

1. R.F.Coughlin and Fredrick Driscoll, "Op-amps and Linear ICs", 6th Edition, PHI.
2. David A.Bell, "Op-amps and Linear ICs", 2nd Edition, Oxford University press, 2010.
3. J. Bhasker, "A VHDL Primer," 3rd Edition, Pearson Education/ PHI.

Course Outcomes:

At the end of this Course the student will be able to

1. Relate the characteristics of differential amplifiers, Op-amp's and their applications. **L4**
2. Understand the operation of op-amp with negative feedback and its frequency response. **L2**
3. Design and analyze amplifiers, filters and converters **L6**
4. Develop oscillators and Multivibrators using Linear IC's **L6**
5. Describe various techniques used in designing A/D and D/A convertors **L1**

B.Tech II Year II Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

20ECE11 - ELECTRONIC CIRCUIT ANALYSIS AND DESIGN LAB

L	T	P	C
0	0	3	1.5

Course Objectives: The objectives of the course are to make the students learn about

1. To design, simulate and test single and multistage amplifiers.
2. To verify the effect of feedback on amplifier parameters.
3. To understand the functioning of oscillator circuits
4. To design and analyse power amplifiers and tuned amplifiers.

List of Experiments (Any 12 experiments to be done)

I) Design and Simulation in Simulation Laboratory using any Simulation Software. (Minimum of 6 Experiments):

1. Common Emitter Amplifier
2. Common Source Amplifier
3. A Two Stage RC Coupled Amplifier.
4. Current shunt and Voltage Series Feedback Amplifier
5. Cascade Amplifier
6. Wien Bridge Oscillator using Transistors
7. RC Phase Shift Oscillator using Transistors
8. Class A Power Amplifier (Transformer less)
9. Class B Complementary Symmetry Amplifier
10. High Frequency Common base (BJT) / Common drain (JFET) Amplifier.

II) Testing in the Hardware Laboratory (6 Experiments)

Any Three circuits simulated in Simulation laboratory

1. Class A Power Amplifier (with transformer load)
2. Class C Power Amplifier
3. Single Tuned Voltage Amplifier
4. Hartley & Colpitt's Oscillators.
5. Darlington Pair.
6. MOSFET Amplifier

Course Outcomes:

At the end of this Course the student will be able to

a. Design, simulate and test single and multistage amplifiers **L6**
b. Verify the effect of feedback on amplifier parameters **L5**
c. Learn the functioning of oscillator circuits **L1**

B.Tech II Year II Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

20ECE14- ANALOG COMMUNICATIONS LAB

L	T	P	C
0	0	3	1.5

Course Objectives: The objectives of the course are to make the students learn about

1. To gain an understanding on analog modulation and demodulation techniques.
2. To recognize the importance of pre-emphasis and de-emphasis.
3. To know the need for diode detector, and AGC.
4. To understand different pulse modulation and demodulation techniques.
5. To perform radio receiver measurements like sensitivity, selectivity and fidelity.

List of Experiments: (Any 10 Experiments are to be conducted)

1. Amplitude Modulation & Demodulation.
2. AM - DSB SC - Modulation & Demodulation.
3. Diode Detector.
4. Characteristics of Mixer
5. Pre-emphasis & De-emphasis.
6. Frequency Modulation & Demodulation.
7. AM / FM Transmitter & Receiver.
8. Verification of Sampling Theorem.
9. Pulse Amplitude Modulation & Demodulation.
10. Pulse Width Modulation & Demodulation.
11. Pulse Position Modulation & Demodulation.
12. Phased Locked Loop.
13. Spectral analysis of modulated signals using Spectrum Analyzer.
14. Radio receiver measurements – sensitivity, selectivity and fidelity.

Course Outcomes:

At the end of this Course the student will be able to

1. Gain an understanding on analog modulation and demodulation techniques **L2**
2. Recognize the importance of pre-emphasis and de-emphasis **L1**
3. Demonstrate the need for diode detector, and AGC **L5**
4. Understand different pulse modulation and demodulation techniques **L2**
5. Measure radio receiver characteristics like sensitivity, selectivity and fidelity **L5**

B.Tech II Year II Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

20ECE16 - LINEAR AND DIGITAL INTEGRATED CIRCUITS LAB

L	T	P	C
0	0	3	1.5

Course Objectives: The objectives of the course are to make the students learn about

1. To design and analyze various applications of op-amp and waveform generation circuits.
2. To get exposure to design and analysis of multivibrators and filters.
3. To get the knowledge about functionality of A/D and D/A converters.
4. To use computer-aided design tools for development of complex digital logic circuits
5. To understand the functionality of various Digital ICs.

Part A: Linear IC Applications

List of Experiments: (any seven using Hardware)

1. Op-Amp applications-Adder, subtractor, comparator
2. Study the characteristics Integrator, differentiator
3. Study the characteristics of negative feedback amplifier
4. Monostable and Astable multivibrator using IC 555 Timer
5. LPF and HPF (First order)
6. Design of Analog filters (2nd order bandpass filter and Notch filter)
7. D/A Converters (R-2R Ladder)
8. A/D Converters (Successive Approximation)
9. Design of a function generator
10. Design of a Voltage Controlled Oscillator (VCO)
11. Design of a Phase Locked Loop (PLL)

Part-B: Digital IC Applications

List of Experiments: (any six using Software)

1. 4 to 8 Decoder- 74138.
2. 8 x 1 Multiplexer-74151 and 2 x 4 De-multiplexer-74155.
3. 4-Bit Comparator-7485.
4. D Flip-Flop-7474.
5. Decade counter-7490.
6. Shift registers-7495 and Universal shift register – 74194/74195
7. Priority encoder- 74LS148

Course Outcomes:

At the end of this Course the student will be able to

1. Design and analyze various applications of op-amps and waveform generation circuits **L6**
2. Analyze the design of Multivibrators and filters **L4**
3. Understand the functionality of A/D and D/A converters **L2**
4. Use computer-aided design tools for development of digital logic circuits . **L3**
5. Learn the functionality of various Digital ICs **L1**

Course Code		ADVANCED DIGITAL SYSTEMS DESIGN	L	T	P	C
Semester	IV		1	0	3	

Prerequisites: Digital Circuits and Systems

Course Objectives:

- To understand the basic concepts of Verilog HDL
- To classify the different modeling techniques
- To familiarize the HDL simulator / synthesis tool
- To design given combinational and sequential circuits

Course Outcomes (CO): Student will be able to

- Understand the basic concepts of Verilog HDL
- Classify the different modeling techniques
- Familiarize the HDL simulator / synthesis tool
- Design given combinational and sequential circuits

Theory:

Module I: Introduction to Verilog HDL and Basic Concepts

- Emergence of HDL, typical design flow, trends in HDL, Modelling concept
- Design methodologies, modules, instances, simulation, design block
- Lexical conventions, Number Specification, Data Types.
- Modules and Ports

Module II: Gate-Level Modelling and Dataflow Modelling

- Gate Types. Gate Delays, Continuous Assignments. Delays. Expressions, Operators, and Operands. Operator Types.
- Examples for combinational and sequential circuit using Gate level and Data-flow modelling.

Module III: Behavioural modelling

- Structured Procedures, Procedural Assignments, Timing Controls, Conditional Statements. Multiway Branching. Loops.

Module IV: Tasks and Functions and Useful modelling Techniques

- Difference between Tasks and Functions, Tasks, Functions.
- Procedural Continuous Assignments.

List of Experiments:

Student must implement any twelve experiments using Vivado Xilinx Design Suite Simulator.

1. Realization of all the Logic Gates.
2. Implementation of 4-bit Adder.
3. Implementation of 4-bit Subtractor.
4. Compute the output for arithmetic expression. y=(a+b*c)/(a+c).
5. Compute the output for Logical expression y= (A & B) | (B & C).
6. Implementation of 2-bit ALU with any 2 arithmetic and logical operations.
7. Implementation of 4-bit Carry Look Ahead Adder.
8. Implementation of 2-to-4 Decoder.
9. Implementation of 8-to-3 Encoder.
10. Implementation of 8-to-1 Multiplexer.
11. Implementation of 1-to-4 De-multiplexer.
12. Implementation of a 4-bit Comparator.
13. Implementation of 4-bit Binary to Gray Code Converter.
14. Implementation of BCD to seven segment decoder using case statement.
15. Implementation of D - Flip Flop and T – Flip Flop.
16. Implementation of 4-bit binary counters (Up and Down Counter).

17. Implementation of a 4- bit Register of Serial- in Serial –out, Serial-in parallel-out, Parallel-in Serial-out and Parallel-in Parallel-Out.

Software Requirements: Vivado Xilinx Design Suite

Textbooks & References:

1. Samir Palnitkar, “Verilog HDL”, Pearson Education (2nd edition).
2. Donald Thomas, Philip moorby, “The Verilog hardware Description language” 5th Edition, Kluwer Academic publishers
3. J. Bhasker, Verilog HDL Synthesis: A Practical Primer,1998

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS):: PULIVENDULA
DEPARTMENT OF CHEMISTRY
II B.TECH – I/II SEMESTER Mandate Course (MC)
(THEORY)

Subject Code	Title of the Subject	L	T	P	C
	Environmental Science	3	0	-	0

COURSE OBJECTIVES	
1	To make the student understand multi disciplinary nature of environment and its components.
2	To investigate the relationship between human life and environment from scientific prospective.
3	To impart knowledge to the students about fundamental concepts of Ecosystem and Biodiversity
4	Necessasity of analyzing regional, national and global environmental problems
5	To understand and apply the fundamentals of Environmental science to important local, regional, national and global environmental problems and potential issues

COURSE OUTCOMES	
CO1	Solve the environmental problems based fundamental concepts of Environmental Science.
CO2	Describe the structure and function of significant environmental systems
CO3	Differentiate Natural and Polluted environment and asses its impact different on the environmental components.
CO4	Apply the Pyramid of number, mass and Energy, Demonstrate about Renweable energy resources. Illustrate the Forest ecosystem, Discuss about Grass and Net biomass productivity
CO5	Differentiate between Forest and desert Ecosystems, Critically evaluate arguments regarding environmental issues. Illustrate the Food chain and food web, Identify the applications of rain water harvesting, Interpret advantages of In-situ and Ex-situ conservation of biodiversity

Mapping between Course Outcomes and Programme Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1												
CO2												
CO3												
CO4												
CO5												

Bos Chairman
Chemistry

SYLLABUS

UNIT-I:

i) Multidisciplinary nature of environmental studies

The **Multidisciplinary** nature of environmental studies Definition; Scope and importance, Need for public awareness.

ii) Natural Resources:

Renewable and non-renewable resources: Natural resources and associated problems.

a) Forest resources: Use and Over-exploitation, deforestation, case studies. Timber extraction, mining, dams and their effects on forests and tribal people.

b) Water resources: Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams benefits and problems.

c) Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies.

d) Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies.

e) Energy resources: Growing energy needs, renewable and non-renewable energy sources, use of alternate energy sources, Case studies.

f) Land resources: Land as a resource, land degradation, man induced landslides, soil erosion and desertification.

- Role of an individual in conservation of natural resources.
- Equitable use of resources for sustainable lifestyles.

UNIT-II:

i) Ecosystems

Concept of an ecosystem, Structure and function of an ecosystem, Producers, consumers and decomposers. Energy flow in the ecosystem, Ecological succession. Food chains, food webs and ecological pyramids.

Introduction, types, characteristic features, structure and function of the following ecosystem: -

a. Forest ecosystem b. Grassland ecosystem c. Desert ecosystem

d. Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries).

ii) Biodiversity and its Conservation

Introduction-Definition: genetic, species and ecosystem diversity. Biogeographical classification of India. Value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values. Biodiversity at global, National and local levels. India as a mega-diversity nation. Hot-spots of biodiversity. Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts. Endangered and endemic species of India. Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity.

UNIT-III:

Environmental Pollution:

Definition - Causes, effects and control measures of: -

a. Air pollution b. Water pollution c. Soil pollution d. Marine pollution

e. Noise pollution f. Thermal pollution g. Nuclear hazards

Solid waste Management: Causes, effects and control measures of urban and industrial wastes.

Role of an individual in prevention of pollution. Pollution case studies. Disaster management: floods, earthquake, cyclone and landslides.

UNIT-IV:

BoS Chairman
BoS chemistry

Social Issues and the Environment

From Unsustainable to Sustainable development. Urban problems related to energy. Water conservation, rain water harvesting, watershed management. Resettlement and rehabilitation of people; its problems and concerns. Case studies. Environmental ethics: Issues and possible solutions. Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust. Case studies. Wasteland reclamation.

Environment Protection Act. Air (Prevention and Control of Pollution) Act. Water (Prevention and Control of Pollution) Act. Wildlife Protection Act. Forest Conservation Act. Issues involved in enforcement of environmental legislation. Public awareness.

UNIT-V:

i) Human Population and the Environment

Population growth, variation among nations. Population explosion-Family welfare Programme. Environment and human health. Human Rights. Value Education. HIV/AIDS. - Women and Child Welfare. Role of information Technology in Environment and human health.
- Case Studies.

ii) Field Work

- Visit to a local area to document environmental assets-river/forest/grassland/ hill/mountain.
- Visit to a local polluted site-Urban/Rural/Industrial/Agricultural.
- Study of common plants, insects, birds.
- Study of simple ecosystems-pond, river, hill slopes, etc.

Text Books:

1. Shashi Chawla, A Text Book of Environmental Studies, Mc Graw Hill Education, 4th edtion, 2014

2. De A.K., Environmental Chemistry, Wiley Eastern Ltd , 2012

Reference Books

1. Bharucha Erach, The Biodiversity of India, Mapin Publishing Pvt. Ltd., Ahmedabad -380013, India, Email: mapin@icenet. net (R).

2. Brunner R.C., 1989, Hazardous Waste Incineration, McGraw Hill Inc. 480p.

3. Cunningham, W.P.Cooper, T.H. Gorhani, E & Hepworth, M.T.2001, Environmental Encyclopedia, Jaico Publ. House, Mumbai, 1196p.

4. Anubha Kaushik and C.P.Kaushik, Basics of Environment and Ecology, New Age International Publishers, 4th Edition, 2012.

BOS chairman
Chemistry

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR
COLLEGE OF ENGINEERING (AUTONOMOUS), PULIVENDULA

B.Tech – IV / V Sem (R20)

L	T	P	C
3	0	0	0

APTITUDE AND REASONING SKILLS

(Common to CIVIL ,ME, EEE, ECE & CSE)

Course Objectives

- To equip students with aptitude and reasoning skills in order to help them succeed in competitive exams.
- To help students improve their knowledge of quantitative and reasoning skills, which in turn helps them comprehend and solve various mathematical problems in professional life.

UNIT 1: Quantitative Aptitude 1:

Number Systems - HCF and LCM - Square Roots and Cube Roots – Averages - Problems on ages – Allegations – Percentages - Profit and loss - Logarithms – Progressions - Decimal Fractions - Simplification.

UNIT 2: Reasoning 1:

Directions - Blood Relations - Series and Sequences - Odd man out.

UNIT 3: Quantitative Aptitude 2:

Permutation and Combination - Ratio and Proportion and variation –Inequalities - Time and Work - Time and Distance - Pipes and Cisterns - Simple interest and Compound interest – Calendar - Clocks.

UNIT 4: Quantitative Aptitude 3:

Mensuration : Area, Volume and Surface Areas
Data Interpretation : Tabulation, Line Graphs, Bar Graphs, Pie charts.

UNIT 5: Reasoning 2:

Coding and Decoding - Data sufficiency-Logical deductions.

Text Books:

1. Quantitative Aptitude, R.S. Agarwal, S. Chand Publishers, New Delhi, 2012.
2. Verbal and Non-Verbal Reasoning, R.S.Agarwal, S.Chand Publishers, New Delhi, 2012.

Reference Books:

1. How to Prepare for Quantitative Aptitude, Arun Sharma, TMH Publishers, New Delhi, 2003.
2. IrnK.Wolf, Barron’s GRE, Sharon Weiner-Green, Galgotia Publications, New Delhi, 2006.
3. More Puzzles, Shakuntala Devi, OPB, New Delhi, 2006.
4. Brain Teasers, Ravi Narula,Jaico Publishing House, New Delhi, 2005.
5. Puzzles and Teasers, George J Summers, Jaico Publishing House, Mumbai, 2005
6. Puzzles to Puzzle you, Shakuntala Devi , Orient Paper Backs Publishers(OPB), New Delhi, 2005.

Course Outcomes:

The student will be able to

- apply the knowledge of general mathematical models discussed to solve a variety of problems.
- read between the lines and understand various mathematical and reasoning concepts.
- demonstrate various principles involved in solving mathematical problems pertain to Quantitative functions.
- crack puzzles, decode information from charts and interpret their logical thinking in the aspects.

B.Tech III Year I Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

20AEC51-ANTENNAS & WAVE PROPAGATION

L–T –P - C
3 – 0 – 0 – 3

Course Objectives:

- To learn the antennas basic terminology, radiation mechanism of antennas and dipole antennas.
- To gain knowledge on few types of antennas, their operation and applications.
- Analyze the working, radiation patterns and applications of microstrip, reflector and lens antennas.
- Understand different techniques involved in the design of antenna arrays and antenna parameter measurements.
- To study the various types of radio wave propagation methods.

UNIT - I

Antenna Basics & Dipole antennas: Definition of antenna, Radiation Mechanism – single wire, two wire, dipoles, Antenna Parameters - Radiation Patterns, Main Lobe and Side Lobes, Beam widths, Beam Area, Radiation Intensity, Beam Efficiency, Directivity, Gain and Resolution, Aperture Efficiency, Effective Height and length, Antenna Theorems. Radiation – Basic Maxwell's equations, Retarded potential-Helmholtz Theorem, Radiation from Small Electric Dipole, Quarter wave Monopole and Half wave Dipole – Current Distributions, Field Components, Radiated power, Radiation Resistance, Beam width, Natural current distributions, far fields and patterns of Thin Linear Center-fed Antennas of different lengths, Illustrative problems.

Learning Outcomes:

At the end of the unit, the student will be able to

- Understand antennas basic terminology and radiation mechanism of antennas.(L2)
- Appreciate the working and applications of dipole antennas.(L1)

UNIT- II

HF, VHF and UHF Antennas: Loop Antennas - Introduction, Small Loop, Comparison of far fields of small loop and short dipole, Radiation Resistances and Directives of small and large loops (Qualitative Treatment), Arrays with Parasitic Elements - Yagi - Uda Arrays, Folded Dipoles & their characteristics. Helical Antennas-Helical Geometry, Helix modes, Practical Design considerations for Monofilar Helical Antenna in Axial and Normal Modes. Horn Antennas- Types, Fermat's Principle, Optimum Horns, Design considerations of Pyramidal Horns, Illustrative Problems.

Learning Outcomes:

At the end of the unit, the student will be able to

- Gain knowledge on the working and applications of Loop antennas.(L1)
- Understand the working and uses of Yagi-Uda, Helical and Horn antennas (L2)

UNIT - III

Microwave Antennas : Micro strip Antennas- Introduction, features, advantages and limitations, Rectangular patch antennas- Geometry and parameters, characteristics of Micro strip antennas, Impact of different parameters on characteristics, reflector antennas - Introduction, Flat sheet and corner reflectors, parabola reflectors- geometry, pattern characteristics, Feed Methods, Reflector Types - Related Features, Lens Antennas - Geometry of Non-metallic Dielectric Lenses, Zoning , Tolerances, Applications, Illustrative Problems.

Learning Outcomes:

At the end of the unit, the student will be able to

- Design the Micro strip Antennas and analyze their performance.(L6)
- Analyze the workingand applications of reflector and lens antennas.(L4)

UNIT- IV

Antenna Arrays: Point sources - Definition, Patterns, arrays of 2 Isotropic sources- Different cases, Principle of Pattern Multiplication, Uniform Linear Arrays – Broadside Arrays, Endfire Arrays, EFA with Increased Directivity, Derivation of their characteristics and comparison, BSAa with Non-uniform Amplitude Distributions - General considerations and Bionomial Arrays, Illustrative problems.

Antenna Measurements: Introduction, Concepts- Reciprocity, Near and Far Fields, Coordination system, sources of errors, Patterns to be Measured, Pattern Measurement Arrangement, Directivity Measurement , Gain Measurements (by comparison, Absolute and 3-Antenna Methods).

Learning Outcomes:

At the end of the unit, the student will be able to

- Design the antenna arrays based on the application.(L6)
- Apply different techniques to measure antenna parameters.(L3)

UNIT - V

Wave Propagation: Introduction, Definitions, Characterizations and general classifications, different modes of wave propagation, Ray/Mode concepts, Ground wave propagation (Qualitative treatment) - Introduction, Plane earth reflections, Space and surface waves, wave tilt, curved earth reflections, Space wave propagation - Introduction, field strength variation with distance and height, effect of earth's curvature, absorption, Super refraction, M-curves and duct propagation, scattering phenomena, tropospheric propagation, fading and path loss calculations, Sky wave propagation - Introduction, structure of Ionosphere, refraction and reflection of sky waves by Ionosphere, Ray path, Critical frequency, MUF, LUF, OF, Virtual height and Skip distance, Relation between MUF and Skip distance, Multi-HOP propagation, Energy loss in Ionosphere, Summary of Wave Characteristics in different frequency ranges, Illustrative problems.

Learning Outcomes:

At the end of the unit, the student will be able to

- Understand the various types of radio wave propagation methods.(L2)
- Identify the type of wave propagation method required based on the type of antenna and application.(L1)

TEXT BOOKS:

1. John D. Kraus, Ronald J. Marhefka and Ahmad S.Khan, "Antennas and wave propagation", TMH, New Delhi, 4th Ed., 2010.
2. C.A. Balanis, "Antenna Theory- Analysis and Design", John Wiley & Sons, 2nd Edn., 2001.

REFERENCES:

1. E.C. Jordan and K.G. Balmain, "Electromagnetic Waves and Radiating Systems", 2nd Edition, PHI, 2000.
2. G.S.N Raju, "Antenna and Wave Propagation", Pearson Education India, 3rd Edition 2009.
3. K.D. Prasad andSatyaPrakashan, "Antennas and Wave Propagation", New Delhi, Tech. India Publications, 2001.

Course Outcomes:

At the end of this course, the students will be able to

- Understand the antennas basic terminology and radiation mechanism of antennas.(L2)
- Gain knowledge on few types of antennas, their operation and applications.(L1)
- Design and analyze the working and applications of microstrip, reflector and lens antennas.(L6)
- Analyze different techniques involved in the design of antenna arrays and antenna parameter measurements.(L4)
- Gain a comprehensive knowledge about the types of radio wave propagation methods.(L1)

B.Tech III Year I Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

20AEC52- DIGITAL COMMUNICATIONS

L–T – P - C
3 – 0 – 0 – 3

Course Objectives:

- To know about sampling, quantization and various source coding techniques.
- To understand the concepts of baseband pulse transmission.
- To analyze representation, conversion and detection of signal space diagram.
- To gain knowledge about various digital modulation techniques and their error probabilities.
- To get familiar with channel coding techniques and multiple access techniques.

UNIT – I

Source Coding Systems: Introduction to digital communications, sampling process, quantization, Pulse-Code Modulation (PCM), Quantization Process, Noise considerations in PCM systems, Line codes, Time-Division Multiplexing (TDM), Delta modulation, Differential pulse-code modulation, Adaptive Differential pulse-code modulation , Comparison of the above systems.

Learning Outcomes:

At the end of the unit, the student will be able to

- Understand basic sampling and quantization techniques.(L2)
- Gain knowledge about various source coding techniques.(L1)

UNIT – II

Baseband Pulse Transmission: Introduction, Matched filter , Properties of Matched filter, Matched filter for Rectangular pulse, Error rate due to noise, Inter-symbol Interference (ISI) , Nyquist criterion for distortion less baseband binary transmission, ideal Nyquist channel, Raised cosine filter & its spectrum, Correlative coding – Duo binary & Modified duo binary signaling schemes, Baseband M-array PAM transmission, Eye diagram.

Learning Outcomes:

At the end of the unit, the student will be able to

- Understand the basic principles of baseband and passband digital modulation schemes.(L2)
- Analyze the performance of Matched filter and its properties.(L4)

UNIT – III

Signal Space Analysis: Introduction, Geometric representation of signals, Gram-Schmidtorthogonalization procedure, Conversion of the Continuous AWGN channel into a vector channel, Coherent detection of signals in noise, Correlation receiver, Equivalence of correlation and Matched filter receivers, Probability of error, Signal constellation diagram.

Learning Outcomes:

At the end of the unit, the student will be able to

- Understand the representation and conversion of signals. (L2)
- Analyzethe detection of signal space diagram.(L4)

UNIT – IV

Digital Modulation Techniques: Introduction, Pass Band Transmission Model,Method of generation and detection of coherent Binary ASK, FSK & PSK,Differential phase shift keying, Quadrature modulation techniques (QAM, QPSK and MSK), M-array PSK, M-array QAM, Comparison of bandwidth requirements and probability of bit error for the above schemes.

Learning Outcomes:

At the end of the unit, the student will be able to

- Understand the performance of various digital modulation techniques.(L2)
- Determine the probability of error for various digital modulation schemes.(L3)

UNIT – V

Channel Coding: Error Detection & Correction - Repetition & Parity Check Codes, Code Vectors and Hamming Distance, Forward Error Correction (FEC) Systems, Automatic Retransmission Query (ARQ) Systems, Linear Block Codes – Matrix Representation of Block Codes, Syndrome Decoding, Convolutional Codes – Convolution Encoding, Decoding Methods.

Introduction of Multiple Access Techniques: Frequency Division Multiple Access, Time Division Multiple Access, Code Division Multiple Access.

Learning Outcomes:

At the end of the unit, the student will be able to

- Describe various error control codes. (L1)
- Understand and appreciate various Multiple Access Techniques.(L2)

TEXT BOOKS:

1. Simon Haykin, "Communication Systems", 4^{th} Edition, John Wiley & Sons INC, 2000
2. Bernard Sklar, "Digital Communications", 2^{nd} edition, Prentice-Hall PTR, 2001.
3. T. S. Rappaport, "Wireless Communications, Principles and Practice", 2^{nd} Edition, Prentice Hall, 2002

REFERENCES:

1. J. G. Proakis, M Salehi and Gerhard Bauch, "Digital Communications", 5^{th}Edition, McGraw-Hill Education private limited 2008.
2. A. Bruce Carlson and Paul B. Crilly, "Communication Systems – An Introduction to Signals & Noise in Electrical Communication", 4^{th} Edition, McGraw-Hill International Edition, 2002.

Course Outcomes:

At the end of the course, the students will be able to

- Understand the concepts of sampling, quantization and various coding techniques. (L2)
- Summarize the concepts of baseband pulse transmission.(L2)
- Analyze representation, conversion and detection of signal space diagram.(L4)
- Compare various digital modulation techniques and their error probabilities.(L2)
- Understand channel coding techniques and multiple access techniques.(L2)

B.Tech III Year I Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

20AEC53- MICROPROCESSORS & MICROCONTROLLERS

L–T – P - C
3 – 0 – 0 – 3

Course Objectives:

- To develop an in-depth understanding of the operation of microprocessors.
- To learn about the architecture of the microprocessor and interfacing DMA controller.
- To understand the parallel and serial data transfer, basic peripherals devices their programming and interfacing techniques.
- To gain knowledge of the concepts of Interrupt of 8086.
- To impart the basic concepts of microcontrollers, programming and interfacing.

UNIT-I

Introduction: Microprocessor based personal computer system, 8085 Micro Processors: Architecture, Register Organizing, Addressing modes.

8086 Micro Processors: Programmer's model for 8086, memory and register organization of 8086, Addressing modes, Instruction set of 8086, Assembler directives and operators, Interrupts, Assembly language programming.

Learning Outcomes:

At the end of the unit, the student will be able to:

- Gain knowledge on architecture, internal organization, addressing modes and instruction sets of 8085 processors.(L1)
- Understandthe architecture, usage of different addressing modes and instruction set of 8086 microprocessor. (L2)

UNIT- II

Interfacing with 8086 –Part 1: Pin diagram detail of 8086, Minimum and Maximum mode of operations, Bus Timings, T state Calculations, Memory interface to 8086, DMA Controller: 8257 and 8237 their interfacing to 8086.

Learning Outcomes:

At the end of the unit, the student will be able to:

- Understand the pin diagram of 8086 and interfacing of memory to 8086. (L2)
- Learn the operation of DMA controller and interfacing to 8086.(L1)

UNIT-III

Interfacing with 8086 – Part 2: Parallel and serial data transfer methods, I/O interface method, 8255 PPI chip, Interfacing with 7 segment LEDs, Interfacing with keyboards, Interfacing with ADCs, Interfacing with DACs, Interfacing with Stepper Motor.

Learning Outcomes:

At the end of the unit, the student will be able to:

- Perform parallel and serial data transfer using 8086 microprocessor.(L3)
- Interface input – output modules and convert analog data to digital data and vice versa.(L4)

UNIT-IV

Interfacing with 8086 – Part 3: Interrupts of 8086, Programming with DOS and BIOS function calls, 8259 interrupt controller and its interfacing with 8086, cascade mode of operation of 8259.

Learning Outcomes:

At the end of the unit, the student will be able to:

- Appreciate the importance and usage of Interrupts of 8086.(L1)
- Gain knowledge on interfacing 8259-interrupt controller and cascade mode of operation of 8259.(L1)

UNIT–V

Introduction to Microcontrollers : 8051 Micro Controllers: Architecture, Registers Organization, Memory Organization, Pin Description, Connections, I/O Ports, Timers and their modes of operations, Serial Communication - Basics of Serial communication, UART, RS 232 Protocol, 8051 interface to RS 232, 8051 UART Programming, SPI and I^2C implementation on 8051, Addressing Modes, Instruction Set, Assembly directives, Simple assembly software programs with 8051, Interfacing:LEDs, LCDs and switches.

Learning Outcomes:

At the end of the unit, the student will be able to:

- Understand 8051 microcontroller architecture, internal organization and different modes of operations.(L2)
- Identify the usage of Serial Communication and writeassembly software programs with 8051.(L1)

TEXT BOOKS:

1. Ramesh Gaonkar, "Microprocessor Architecture, Programming and Applications with the 8085", 6^{th} Edition, Penram International Publishing, 2013
2. Douglas V. Hall and S. S. SP Rao, "Microprocessors and Interfacing", 3^{rd} Edition, Tata McGraw Hill, 2012.
3. M.A. Mazidiand J.C. Mazidi,"Microcontroller and Embedded systems using Assembly & C", 2^{nd} Edition, Pearson Education, 2007.

REFERENCES:

1. A.K.Ray andK.M.Bhurchandi, "Advanced Microprocessors and Peripherals", 3^{rd} Edition, Tata McGraw Hill, 2006.
2. Kenneth J Ayala, "The 8051 Microcontroller", 3^{rd} Edition, Thomson Delmar Learning, 2004.

Course Outcomes:

At the end of this course, the students will be able to

- Define the basic concepts of microprocessors operation. (L1)
- Describe the architecture of the microprocessor and how to interface DMA controller. (L1)
- Analyze parallel and serial data transfer, and interface basic peripherals devices.(L4)
- Describe the concepts of Interrupts of 8086.(L1)
- Describe the basic concepts of microcontrollers, programming and interfacing. (L1)

B.Tech III Year I Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

20AEC54a- INDUSTRIAL ELECTRONICS

(Professional Elective-I)

L–T – P - C
3 – 0 – 0 – 3

Course Objectives:

- To learn the construction, working and applications of power transistors and thyristors.
- To gain knowledge about Power MOSFETs and different types of protection circuits.
- To study the operation of Rectifiers, Inverters, Relays and Timers.
- To know about the industrial applications of electronics in welding and heating.
- To understand the industrial applications of Ultrasonic's.

UNIT-I

Power Bipolar Junction Transistors and Thyristor Power Devices: Introduction, Transistor Structures, Current-Voltage Characteristics, Second Breakdown, Safe Operating Area (SOA), Fabrication of Power Transistors, Power derating, Polarized Snubber.

Thyristor Structure, Thyristor Turn-on and Turn-off Methods, Thyristor Ratings, SCR Applications, Light Activated Silicon Controlled Rectifier (LASCR), Shockley Diode, Diac and Triac, Uni Junction Transistor(UJT), UJT Relaxation Oscillator, Full Wave Phase Control Circuit, Programmable UJT(PUT), Complementary UJT (CUJT), The Silicon Controlled Switch (SCS), Gate Turn Off Thyristors (GTO), Gate Drive Circuits.

Learning Outcomes:

At the end of the unit, the student will be able to:

- Gain knowledge on working of power transistors and thyristors.(L1)
- Understand the industrial applications of power transistors and thyristors.(L2)

UNIT-II

Power Switching Devices and Protection Circuits: Power MOSFETs, Power Semiconductor Switches, Power Semiconductor Materials, Power Integrated Chips (PIC).

Power MOSFETs, Power Semiconductor Switches, Power Integrated Chips (PIC), Cooling & Heat Sinks, Protection of Semiconductor Devices, Gate Protection Circuits, Gate Drive Circuits, Protection of Power Transistors, Series and Parallel Connection of Thyristors.

Learning Outcomes:

At the end of the unit, the student will be able to:

- Understand the working of Power MOSFETs, Switches & Integrated Chips.(L2)
- Know the importance of Heat Sinks & Protection circuits.(L1)

UNIT-III

Rectifiers And Inverters : Flywheel Diode, Half-Wave Rectifier Circuit with Inductive Load, Single Phase Full Wave Rectifier Circuit with RL Load, Poly Phase Rectifiers, Three Phase Rectifier with Delta-Star Connected Transformer, Six Phase Half-Wave Rectifier, Controlled Poly Phase Rectifiers, Effect of Inductance, Voltage Multiplier Circuit, Inverters, Thyristorized Inverters, Series Type Inverter, Modified Series Inverter, McMURRAY-BEDFORD Inverter Bridge.

Relays And Timers: Basic Construction of Relays, AC relays, RC Charging & Discharging Circuits, UJT/SCR, AC & Precision Long Time Delay Relays, Integrated Circuit Timers, Synchronous Timer, Sequence Timer Employing 555.

Learning Outcomes:

At the end of the unit, the student will be able to:

- Explain the working of multiphase rectifiers and inverters.(L2)
- Know the industrial applications of relays and timers.(L1)

UNIT IV

INDUSTRIAL APPLICATIONS – I

Resistance Welding Controls: Introduction, Resistance welding process, Basic Circuit for A.C. resistance welding, Types of Resistance welding, electronic welding control used in Resistance welding, Energy storage welding.

Induction Heating: Principle of induction heating, Theory of Induction heating merits of induction heating, Application of induction heating, High frequency power source of induction heating.

Dielectric Heating: Principle of dielectric heating, theory of dielectric heating, dielectric properties of typical materials, electrodes used in dielectric heating, method of coupling of electrodes to the R.F. generator, Thermal losses in Dielectric heating, Applications.

Learning Outcomes:

At the end of the unit, the student will be able to:

- Understand different types of resistance welding processes and controls.(L2)
- Appreciate the industrial applications of induction heating & dielectric heating.(L1)

UNIT V:

INDUSTRIAL APPLICATIONS - II

Ultrasonics: Introduction, Generation of Ultrasonic waves, Application of Ultrasonic waves, Ultrasonic stroboscope, ultrasonic as means of communication, ultrasonic flaw detection, Optical image on non-homogeneities, ultrasonic study of structure of matter, Dispersive study of structure of matter, Dispersive and colloidal effect of Ultrasonic, Coagulating action of Ultrasonic, separation of mixtures by ultrasonic waves, cutting and machining of hard materials by ultrasonic vibrations, Degassing of liquids by ultrasonic waves, Physico-chemical effects of ultrasonics, chemical effects of ultrasonics, Thermal effects of Ultrasonics, soldering and welding by ultrasonics, Ultrasonic Drying.

Learning Outcomes:

At the end of the unit, the student will be able to:

- Understand the generation &applications of Ultrasonics. (L2)
- Learn the chemical and thermal effects of Ultrasonics.(L1)

Text Books:

1. S. N Biswas, "Industrial Electronics",DhanpatRai& Co.
2. G. K. Mithal, "Industrial Electronics",Khanna Publishers, 2000.
3. J.Gnanavadivel,R.Dhanasekaran andP.Maruthupandi, "Industrial Electronics",Anuradha Publications, 2011.

References:

1. M. Rammurthy, "Thyristors and Applications", East-West Press, 1977.
2. F. D. Petruzulla, "Industrial Electronics", McGraw Hill, Singapore, 1996.
3. M. H. Rashid, "Power Electronics Circuits, Devices and Application", 3rd Ed., PHI, 2004.

Course Outcomes:

At the end of this course, the students will be able to

- Understand the construction, working and applications ofpower transistors and thyristors. (L2)
- Know about Power MOSFETs and different types of protection circuits.(L1)
- Appreciate the working of Rectifiers, Inverters, Relays and Timers. (L1)
- Know the industrial applications of electronics in welding and heating. (L1)
- Understand the industrial applications of Ultrasonics. (L2)

B.Tech III Year I Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

20AEC54b- CONTROL SYSTEMS

(Professional Elective-I)

L–T – P - C
3 – 0 – 0 – 3

COURSE OBJECTIVES:

- To introduce the basic principles and applications of control systems.
- To learn the time response and steady state response of the systems.
- To know the time domain analysis and solutions to time invariant systems.
- To understand different aspects of stability analysis of systems in frequency domain.
- To understand the concept of state space, controllability andobservability.

UNIT–I

Control SystemsConcepts: Open loop and closed loop control systems and their differences-Examples of control systems- Classification of control systems, Feedback characteristics, Effects of positive and negative feedback, Mathematical models – Differential equations of translational and rotational mechanical systems and electrical systems, Analogous Systems, Block diagram reduction methods – Signal flow graphs - Reduction using Mason's gain formula. Principle of operation of DC and AC Servo motor, Transfer function of DC servo motor - AC servo motor,Synchros.

Learning Outcomes:

At the end of the unit, the student will be able to

- Write the differential equations for mechanical and electrical systems (L1).
- Obtain the transfer function from block diagrams and signal flow graphs (L2).

UNIT-II

Time Response Analysis: Step Response - Impulse Response - Time response of first order systems – Characteristic Equation of Feedback control systems, Transient response of second order systems - Time domain specifications – Steady state response - Steady state errors and error constants, Study of effects and Design of P, PI, PD and PID Controllers on second order system.

Learning Outcomes:

At the end of the unit, the student will be able to

- Understand the time domain analysis of a given system. (L2).
- Compare Proportional, Integral and Derivative controllers (L2).

UNIT-III

Stability Analysis in TimeDomain: The concept of stability – Routh's stability criterion – Stability and conditional stability - limitations of Routh's stability. The Root locus concept - construction of root loci-effects of adding poles and zeros to G(s) H(s) on the rootloci.

Learning Outcomes:

At the end of the unit, the student will be able to

- Analyze the concept of stability in timedomain (L4).
- Apply the concept of Routh's stability and Root locus in timedomain (L3).

UNIT–IV

Frequency ResponseAnalysis: Introduction, Frequency domain specifications-Bode diagrams-Determination of Frequency domain specifications and transfer function from the Bode Diagram - Stability Analysis from Bode Plots. Polar Plots-Nyquist Plots- Phase margin and Gain margin-StabilityAnalysis.

Compensation techniques – Study of Effects and Design of Lag, Lead, Lag-Lead Compensator design in frequency Domain on a second order system.

Learning Outcomes:

At the end of the unit, the student will be able to

- Do frequency domain analysis on the given systems. (L4).
- Understand the usage of Bode plots and Nyquist plots. (L2)

UNIT–V

State Space Analysis of Continuous Systems: Concepts of state, state variables and state model - differential equations & Transfer function models - Block diagrams. Diagonalization, Transfer function from state model, solving the Time invariant state Equations- State Transition Matrix and it's Properties. System response through State Space models.The concepts of controllability and observability, Duality between controllability and observability.

Learning Outcomes:

At the end of the unit, the student will be able to

- Understand the concept of state space, controllability and observability (L2).
- Summarize the state transition method of solving time invariant state equations (L2).

TEXTBOOKS:

1. Modern Control Engineering by Katsuhiko Ogata, Prentice Hall of India Pvt. Ltd., 5^{th}edition, 2010.
2. Control Systems Engineering by I. J. Nagrath and M. Gopal, New Age International (P) Limited Publishers, 5^{th} edition,2007.

REFERENCE BOOKS:

1. Control Systems Principles & Design by M.Gopal, 4^{th} Edition, McGraw Hill Education,2012.
2. Automatic Control Systems by B. C. Kuo and FaridGolnaraghi, John wiley and sons, 8th edition,2003.
3. Feedback and Control Systems, Joseph J Distefano III, Allen R Stubberud& Ivan J Williams, 2^{nd} Edition, Schaum's outlines, McGraw Hill Education,2013.
4. Control System Design by Graham C. Goodwin, Stefan F. Graebe and Mario E. Salgado, Pearson, 2000.
5. Feedback Control of Dynamic Systems by Gene F. Franklin, J.D. Powell and Abbas Emami-Naeini, 6^{th} Edition, Pearson,2010.

COURSE OUTCOMES:

After completing the course, the student should be able to:

- Summarize the basic principles and applications of control systems.(L2)
- Understand the time response and steady state response of the systems.(L2)
- Apply time domain analysis to find solutions to time invariant systems.(L3)
- Analyze different aspects of stability analysis of systems in frequency domain.(L4)
- Understand the concept of state space, controllability and observability.(L2)

B.Tech III Year I Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

20AEC54c- INFORMATION THEORY AND CODING

(Professional Elective-I)

L–T – P - C
3 – 0 – 0 – 3

Course objectives:

- To analyze the concepts of source coding and channel models.
- To analyze different types of error correcting codes.
- To understand the concepts of coded modulation and TCM Design rules
- To gain knowledge on Cryptography, Encryption techniques and Algorithms.
- To learn Pseudo noise sequence and Spread Spectrum techniques.

UNIT I

Source Coding: Introduction to information theory, Uncertainty and information, Average mutual information and entropy, information measures for continuous random variables, source coding theorem, the Lempel-Ziv algorithm, run length coding and PCX format, rate distortion function, introduction to image compression.

Channel Models And Coding: Introduction, Channel models, channel capacity, channel coding, information capacity theorem, channel capacity for MIMO systems, Random selection of codes

Learning Outcomes:

At the end of the unit, the student will be able to:

- Gain knowledge on source coding techniques.(L1)
- Understand the channel models and channel capacity measurements.(L2)

UNIT II

Error Control Coding: Introduction to Error Correcting Codes, Basic Definitions, Equivalent Codes, Perfect Codes, Low Density Parity Check(LDPC) Codes, Optimal Linear Codes, Maximum Distance Separable(MDS)Codes, Bound son Minimum Distance, Space Time Block Codes .

Learning Outcomes:

At the end of the unit, the student will be able to:

- Compare different error control coding techniques.(L2)
- Understand how to find errors in the transmitted data .(L2)

UNIT III

Trellis Coded Modulation: Introduction to TCM, Concept of Coded Modulation, Mapping by Set Partitioning, Unger boeck's TCM Design Rules, TCM Decoder, Performance Evaluation for AWGN Channel, Computation of d_{free}, Space Time Trellis Codes.

Learning Outcomes:

At the end of the unit, the student will be able to:

- Apply the knowledge gained on trellis coded modulation (L3)
- Understand the TCM design rulesand space time trellis codes (L2)

UNIT IV

Coding For Secure Communications: Introduction to Cryptography, An Overview of Encryption Techniques, Operations Used by Encryption Algorithms, Symmetric (SecretKey) Cryptography, Data Encryption Standard(DES), International Data Encryption Algorithm(IDEA), RC Ciphers, Asymmetric(Public-Key)Algorithms, The RSA Algorithm, Quantum Cryptography, Biometric Encryption, Cryptanalysis.

Learning Outcomes:

At the end of the unit, the student will be able to:

- Gain knowledge on importance of secure communications.(L1)
- Analyze different types of encryption and cryptanalysis techniques.(L4)

UNIT V

Spread Spectrum Modulation: Pseudo noise sequence, properties of maximum length sequence, principle of Direct Sequence Spread Spectrum (DSSS), DSSS with coherent binary phase shift keying, frequency hop spread spectrum, fast frequency hopping and its applications.

Learning Outcomes:

At the end of the unit, the student will be able to:

- Understand pseudo noise sequence and its properties. (L2)
- Gain knowledge on spread spectrum modulation techniques. (L1)

TEXT BOOKS

1. R Bose, "Information Theory, Coding and Cryptography", TMH 2007
2. K N HariBhat and D Ganesh Rao," Digital Communications", Pearson, 3E, 2010

REFERENCE BOOKS

1. H. Taub and D. Schilling, "Principles of Communication Systems", TMH, 2003
2. John Proakis, "Digital Communications", TMH, 1983.
3. Singh and Sapre, "Communication Systems Analog & Digital", TMH, 2004.

Course Outcomes:

Upon the successful completion of this course a student will be able to:

- Grasp the concepts of source coding and channel models.(L1)
- Understand different types of error correcting codes.(L2)
- Apply the concepts of coded modulation and TCM Design Rules (L3)
- Understand Cryptography, Encryption techniques and Algorithms.(L2)
- Explain Pseudo noise sequence and Spread Spectrum techniques.(L1)

SOFT SKILLS

(Common to all branches)

L	T	P	C
1	0	2	2

Course Objectives:

- To prepare to face global competition for employment and excellence in profession.
- To help the students understand and build interpersonal and interpersonal skills that will enable them to lead meaningful professional life.

UNIT – 1: SOFT SKILLS: INTRODUCTIUON

Soft Skills: Definition-Meaning--Importance- Why skill gap -Analysis--Personality Development vs. Soft Skills- Learning Methods.

Learning Outcomes:

At the end of this unit, the student will be able to

• Developing self-motivation, raised aspirations and belief in one's own abilities, defining and committing to achieving one's goals.	L1
• Learning to keep going when things don't go according to plan, coping with the unfamiliar, managing disappointment and dealing with conflict	L2

UNIT – II: PERSONAL SKILLS

Intra-Personal: Definition-Meaning-Importance-SWOT analysis- Goal Setting- Emotional Intelligence- Right thinking- Problem Solving-Time management.

Inter-Personal: Definition-Meaning-Importance-Communications skills- Team Work- Negotiation Skills-Leadership skills.

Learning Outcomes:

At the end of this unit, the student will be able to

• A commitment to ethics and integrity in academic and professional relationships, within the community and the environment.	L1
• Describe how good communication with other can influence our working relationships	L2

UNIT – III: VERBAL AND NON VERBAL SKILLS

Verbal Skills: Definition and Meaning-Importance-Improving Tips for Listening, Speaking, Reading- Writing Skills.

Non Verbal Skills: Definition and Meaning-Importance- Dress Code- Facial Expressions- Eye Contact- Proxemics- Haptics -Posture -Kinetics- Para Language.

Learning Outcomes:

At the end of this unit, the student will be able to

• Compares verbal and nonverbal communication	L1
• Understand the functions of nonverbal communication	L2

UNIT – IV: FINISHING SCHOOL

Before Interview: Bridging between Campus and Corporate- Preparation of Resume-Cover Letter- Statement of Purpose-E-mail writing-Corporate Etiquettes.

Learning Outcomes:	
At the end of this unit, the student will be able to	
• Learner will be able to prepare his/ her own Resume and Cover letter.	**L1**
• Learner will understand the importance of etiquettes and learn the nuances of expected behaviour within a group, a social class and society at general	**L2**

UNIT – V: DURING INTERVIEW

Interview Skills: Importance-Purpose- Types of interviews –Preparation for interviews - Top Questions- Body Language in Interview Room-Do's and Don'ts s of interview.

Learning Outcomes:	
At the end of this unit, the student will be able to	
• Learner will be able to face interview questions and effectively present his /her. skills	**L1**
• Learner will manage how to plan and organize personal and professional life.	**L2**

Reference Books:

1. Sherfield, M. Robert at al ***Cornerstone Developing Soft Skills***, 4th ed. Pearson Publication, New Delhi, 2014.
2. Alka Wadkar, ***Life Skills for Success***, Sage Publications India Private Limited; First edition (1 May 2016)
3. Sambaiah.M. ***Technical English***, Wiley publishers India. New Delhi. 2014.
4. Gangadhar Joshi, ***From Campus to Corporate***, *Sage Text*.
5. Alex.K, ***Soft Skills***, 3rd ed. S. Chand Publication, New Delhi, 2014.
6. Meenakshi Raman and Sangita Sharma, ***Technical Communication: Principle and Practice***, Oxford University Press. 2009.
7. Shalini Varma, ***Body Language for Your Success Mantra***, 4th ed, S. Chand Publication, New Delhi, 2014.
8. Stephen Covey, ***Seven Habits of Highly Effective People***, JMD Book, 2013.

Course Outcomes:	
At the end of this Course the student will be able to	
• The students will be able to assimilate and understood the meaning and importance of soft skills and learn how to develop them.	**L1**
• The students will understand the significance of soft skills in the working environment for professional excellence.	**L2**
• The students will be prepared to undergo the placement process with confidence and clarity.	**L3**
• The students will be ready to face any situation in life and equip themselves to handle them effectively.	**L4**
• The students will understand and learn the importance of etiquettes in both professional and personal life	**L5**

B.Tech III Year I Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

20AEC57- DIGITAL COMMUNICATIONS LAB

L–T – P - C
0 – 0 –3-1.5

Course Objectives:

- To gain an understanding of analog to digital conversion techniques.
- To understand digital modulation, Source coding and Channel coding techniques.
- To analyze different digital communications techniques using MAT Lab tools.

Minimum of Twelve experiments to be conducted (Part A -Eight & Part B - Four)

PART-A: HARDWARE EXPERIMENTS

1. Sampling Theorem – verification.
2. Time division multiplexing.
3. Pulse code modulation.
4. Differential pulse code modulation.
5. Delta modulation.
6. Amplitude shift keying modulation and demodulation.
7. Frequency shift keying modulation and demodulation.
8. Phase shift keying modulation and demodulation.
9. Differential phase shift keying.
10. QPSK modulation and demodulation.
11. Linear Block Code – Encoder and Decoder.
12. Binary Cyclic Code – Encoder and Decoder.
13. Convolution Code – Encoder and Decoder.

PART-B: SOFTWARE EXPERIMENTS

1. Sampling Theorem – verification.
2. Pulse code modulation.
3. Differential pulse code modulation.
4. Delta modulation.
5. Frequency shift keying.
6. Phase shift keying.
7. Differential phase shift keying.
8. QPSK modulation and demodulation.

Course Outcomes:

At the end of this course, the students will be able to

- Explain and demonstrate the conversion of analog to digital signals.(L3)
- Grasp the significance of digital modulation, Source coding and Channel coding techniques.(L1)
- Analyze different digital communications techniques using MATLAB tools.(L4)

B.Tech III Year I Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

20AEC58- MICROPROCESSORS & MICROCONTROLLERS LAB

L–T – P - C
0 - 0 - 3 -1.5

Course Objectives:

- To become skilled in 8086 assembly language programming.
- To understand programmable peripheral devices and their interfacing.
- To learn interfacing and writing assembly language programming with 8051 microcontroller.

Minimum Ten Experiments to be conducted (Five from each section)

I) 8086 Microprocessor Programs using MASM/8086 kit.

1. Introduction to MASM Programming.
2. Arithmetic operation – Multi byte Addition and Subtraction, Multiplication and Division – Signed and unsigned Arithmetic operation, ASCII – arithmetic operation.
3. Logic operations – Shift and rotate – Converting packed BCD to unpacked BCD, BCD to ASCII conversion.
4. By using string operation and Instruction prefix: Move Block, Reverse string, Sorting, Length of the string, String comparison.

Interfacing:

5. 8259 – Interrupt Controller and its interfacing programs
6. A /D Interfacing
7. D /A Interfacing
8. Stepper Motor.

II) Microcontroller 8051 Trainer kit

1. Arithmetic operation – Multi byte Addition and Subtraction, Multiplication and Division – Signed and unsigned Arithmetic operation.
2. Logic operations – Shift and rotate.
3. Sorting- Ascending and descending order.

Interfacing using 8051 Trainer kit:

4. A/D Interfacing
5. D /A Interfacing
6. Switch Interfacing
7. Relay Interfacing

Course Outcomes:

At the end of this course, the students will be able to

- Write programs in assembly language and work with 8086 microprocessor.(L6)
- Interface programmable peripheral devices with 8086 microprocessor (L3).
- Learn interfacing and write assembly language programming with 8051 microcontroller.(L1)

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

B.Tech. V-Sem (R20)

FUZZY SET THEORY, ARITHMETIC AND LOGIC

(Open Elective -I)

L	T	P	C
3	0	0	3

Course Objectives: This course aims at providing

- the basic knowledge to understand Fuzzy set theory and Arithmetic. and
- Logic, related to a real word problems of engineering, Science etc.

UNIT – 1: Classical (Crisp) Sets To Fuzzy Sets & Fuzzy Sets Versus Crisp Sets: **9 Hrs**

Classical (Crisp) Sets To Fuzzy Sets:

Introduction: Crisp Sets: An Overview, Fuzzy Sets: Basic Types, Fuzzy Sets: Basic Concepts.

Fuzzy Sets Versus Crisp Sets:

Alpha -Cuts :Additional Properties of alpha -Cuts, Representations of Fuzzy Sets, Extension Principle for Fuzzy Sets.

Learning Outcomes:

At the end of this unit, the student will be able to

• The basic concepts of Sets and Fuzzy sets	L2
• Analyze the Fuzzy Sets Versus Crisp Sets	L3

UNIT – II: Operations On Fuzzy Sets:

Types of Operations, Fuzzy Complements, Fuzzy Intersections: t-Norms.

Fuzzy Unions: t-Conorms ,Combinations of Operations, Aggregation Operations.

Learning Outcomes:

At the end of this unit, the student will be able to

• Do some operations on Fuzzy sets	L2
• Assess t-Norms Fuzzy Unions	L3

UNIT – III: Fuzzy Arithmetic & Fuzzy Relations :

Fuzzy Arithmetic :

Fuzzy Numbers, Linguistic Variables, Arithmetic Operations on Intervals, Arithmetic Operations on Fuzzy Numbers, Lattice of Fuzzy Numbers, Fuzzy Equations.

Fuzzy Relations:

Crisp versus Fuzzy Relations, Projections and Cylindric Extensions, Binary Fuzzy Relations, Binary Relations on a Single Set, Fuzzy Equivalence Relations, Fuzzy Compatibility Relations, Fuzzy Ordering Relations.

Learning Outcomes:

At the end of this unit, the student will be able to

• Perform arithmetic operations on Fuzzy numbers and equations.	L2
• Analyze Fuzzy Relations, Projections and Cylindric Extensions etc.	L3

Hrpuy

UNIT – IV: Fuzzy Relation Equations & Possibility Theory:

Fuzzy Relation Equations:

General Discussion ,Problem Partitioning ,Solution Method.

Possibility Theory:

Fuzzy Measures, Evidence Theory, Possibility Theory, Fuzzy Sets and Possibilty Theory, Possibility Theory versus Probability Theory.

Learning Outcomes:

At the end of this unit, the student will be able to

• Solve Fuzzy relation equations.	L3
• Analyze Possibility Theory.	L4

UNIT – V: Fuzzy logic:

Classical Logic: An Overview, Multi-valued Logics, Fuzzy Propositions, Fuzzy Quantifiers, Linguistic Hedges, Inference from Conditional Fuzzy Propositions, Inference from Conditional and Qualified Propositions, Inference from Quantified Propositions.

Learning Outcomes:

At the end of this unit, the student will be able to

• Understand the Fuzzy logic.	L1
• Analyze the Inferences from Conditional, Qualified, and Quantified Propositions.	L4

Text Books:

1. Fuzzy Sets and Fuzzy Logic, Geoge J. Klir and Bo Yuan

Reference Books:

1. Fuzzy Mathematical Models in Engineering and Management Science, A. Kaufmann and M.M. Gupta
2. Fuzzy Logic, Timothy J. Ross
3. Fuzzy Set Theory, H.J. Zimmermann
4. Introduction to Fuzzy Logic and Fuzzy Sets, J.J. Buckley and E. Eslami

Course Outcomes:

At the end of this Course the student will be able to

• Understand the basic concepts of Fuzzy sets and logic.	**L1**
• Do some operations of Fuzzy sets.	**L2**
• Solve Fuzzy relation equations.	**L3**
• Analyze the Inferences from Conditional, Qualified, and Quantified Propositions.	**L4**
• analyze the real word problem through the technique of Fuzzy set theory and logic to have better insight of the real word problems.	**L5**

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JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS)::PULIVENDULA
DEPARTMENT OF PHYSICS
III B.TECH – I SEMESTER-R20 (Open elective-Interdisciplinary) –OE-ID.1(THEORY)

FUNCTIONAL NANOMATERIALS FOR ENGINEERS
(Common to all branches)

L	T	P	C
3	0	0	3

Course Objectives:

- Be able to describe the terminology and basics of smart materials and smart systems
- Be able to understand the classification and applications of smart materials.
- Be able to understand the use of appropriate materials for energy applications.
- Be able to identify appropriate techniques for understanding the mechanisms of nanosensors
- Be able to explain the concepts of self-assembling monolayers and their applications

UNIT-I: INTRODUCTION TO FUNCTIONAL /SMART NANOMATERIALS — 9 Hrs

Introduction:-Nanomaterials and their importance (in brief), Functional/ Smart Nanomaterials, –(Hydrogels, Carbon nanotubes) and their Functionalization techniques, Properties of Smart materials (Sensing materials, Actuation materials, Self-detection, Self-corrective, self-healing, Shock Absorbers)- Components of smart systems (Sensor :- Data Acquisition, Data Transmission; Command and control unit, Actuator:- Data Instructions, Action Devices)

Learning Outcomes:

At the end of this unit, the student will be able to

• **Understand** the basic properties and functionalization of smart nanomaterials	L1
• **Explain** the need of functional/smart nanomaterials for advanced tecghnology	L2
• **Identify** engineering applications of sensors	L3
• **Analyze** the sensing, control and detection mechanism in smart nanomaterials	L4
• **Illustrate** the components of smart systems	L2

UNIT-II: CLASSIFICATION AND APPLICATIONS — 9 Hrs

Introduction, Classification of smart materials (piezoelectric, electrostrictive, Magnetostrictive, Thermoresponsive and Electrochromic), Shape Memory Alloys and their working principle, Applications of smart materials in Aircrafts, Medicine, Robotics,Smart fabrics, Sporting goods and smart glass, Merits and de-merits of smart materials.

Learning Outcomes:

At the end of this unit, the student will be able to

• **Classify** smart materials based on electrical, magnetic and thermal characteristics	L1
• **Understand** the basic concepts and working principle of memory alloys	L2
• **Identifies** the Engineering applications of smart materials	L2
• **Apply** the concepts to Aircrafts, Medicine and Robotic fields	L3
• **Identify** the Merits and demerits of smart materials in engineering field	L2

Unit-III NANOSENSORS — 9 Hrs

Introduction, Principle of nanosensors, Types of nanosensors (Physicalnanosensors – *Pressure, Force, Mass, Displacement*, Optical nanosensors – *Proximity, Ambient light*, Chemical nanosensors- *Chemical composition, Molecular concentration*).Applications of nanosensors (Medicine, Aerospace, Communication, Structural Engineering).

Learning Outcomes:	
At the end of this unit, the student will be able to	
• **Explain** the working principle and concept of nanosensors	L1
• **Classify** the nanosensors based on their working principle and application	L2
• **Summarize** various types of nanosensors	L2
• **Explain** the applications of nanosensors in various fields	L2
• **Apply** the concept of nanosensors in Medicine, Aerospace, Communication, Structural Engineering fields	L3

UNIT-IV: SELF-ASSEMBLING MONO LAYERS **9Hrs**

Introduction, principles of self-assembly, monolayers, Characteristics of Self assembled monolayers (SAMs), Types of SAMs, Factors influencing Monolayer order, Methods of preparation of SAMs(Langmuir- Boldgett film :Mechanism, Experimental arrangement, Assembly, Advantages and disadvantages of LB films) patterning of SAMs (Locally attract, Locally remove, Modify tail group).Applications (Self-cleaning and moisture repellent).

Learning Outcomes:	
At the end of this unit, the student will be able to	
• **Explain** the concept of self-assembling	L1
• **Understand** the significance of molecular layers	L2
• **Explain** the concept of Langmuir- Boldgett film preparation	L2
• **Explain** the important factors influencing Monolayer order	L2
• **Classify** the materials based on patterning of SAMs	L2
• **Apply** the concept of Self-cleaning and moisture repellent	L3

UNIT-V: NANOMATERIALS FOR ENERGY APPLICATIONS **9Hrs**

Introduction, **Solar Cells** (Silicon Solar Cells, Thin film Solar Cells, Organic Solar Cells, Polymer solar cells) Working Principle, Efficiency estimation and advantages. **HydrogenFuel Cells** – Working Principle, Configuration, Assembly of fuel cell, Water **splitting** – H_2 Production, Photocatalytic process.

Learning Outcomes:	
At the end of this unit, the student will be able to	
• **Explain** the concept of solar cell	L1
• **Classify** the solar cells based on manufacturing material	L2
• **Explain** the construction and working principle of solar cell	L2
• **Interpret** the efficiency and advantages in various solar cells	L2
• **Explain** the construction and working principle of hydrogen cells	L2
• **Identify** applications of water splitting for H_2 production	L2
• **Explain** the photocatalytic process	L2

Text Books:

1. YaserDahman, Nanotechnology and Functional Materials for Engineers-, Elsevier, 2012
2. E. Zschech,C. Whelan, T. Mikolajick, Materials for Information Technology: Devices, Interconnects and Packaging Springer-Verlag London Limited 2005.

Reference Books:

1. Gauenzi,P.,Smart Structures, Wiley, 2009.
2. MahmoodAliofkhazraei, Handbook of functional nanomaterials, Vol (1&2), Nova Publishers, 2014.

Course Outcomes:	
At the end of this Course the student will be able to	
• **Identify** the various functional/smart nanomaterials materials	L1
• **Classify** the smart nanomaterials based their applications and properties	L2
• **Apply** the various functional nanomaterials in various applications	L3
• **Classify** the solar cells based on manufacturing material	L4
• `**Interpret** the efficiency and advantages in various solar cells	L5

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA				
B.Tech – III-I-Sem	L	T	P	C
	3	0	0	3

Chemistry of Energy Materials (OE.1)
(common to all branches)

Course Objectives:

- To make the student understand basic electrochemical principles such as standard electrode potentials, emf and applications of electrochemical principles in the design of batteries.
- To understand the basic concepts of processing and limitations of fossil fuels and Fuel cells & their applications.
- To impart knowledge to the students about fundamental concepts of hydrogen storage in different materials and liquefaction method.
- Necessity of harnessing alternate energy resources such as solar energy and its basic concepts.
- To understand and apply the basics of calculations related to material and energy flow in the processes.

UNIT-I: **Electrochemical Systems**	9 Hrs

a) Introduction to Energy- Materials, Chemistry, Engineering and Technology.
b) Electrochemical Systems: Galvanic cell, standard electrode potential, application of EMF, Electrode mechanism, Batteries-Lead-acid and Lithium ion batteries.

Learning Outcomes:
At the end of this unit, the student will be able to:

- Solve the problems based on electrode potential (L3)
- Describe the Galvanic Cell (L2)
- Differentiate between Lead acid and Lithium ion batteries(L2)
- Illustrate the electrical double layer(L2)

UNIT-II:**Fuel Cells**	7 Hrs

Basic design of fuel cell, Fuel cell working principle, Fuel cell efficiency Classification of fuel cells, Polymer electrolyte membrane (PEM) fuel cells, Solid-oxide fuel cells (SOFC), and their applications

Learning Outcomes:
At the end of this unit, the student will be able to:

- Classify the fuel cell(L2)
- Describe the working Principle of Fuel cell(L2)
- Explain the efficiency of the fuel cell (L2)
- Discuss about the Basic design of fuel cells(L3)

UNIT-III: **Hydrogen Storage**	9 Hrs
Hydrogen Storage, Chemical and Physical methods of hydrogen storage, Hydrogen Storage in metal hydrides, metal organic frame works (MOF) zinc-(3-aminotriazolato)-oxalate; MOF-74 (Zn_2 -(2,5-dihydroxy-1,4-benzenedicarboxylate), Carbon structures (Carbon nano tubes, fullerenes), metal oxide porous structures, hydrogen storage by high pressure methods-liquefaction method	
Learning Outcomes: After completing the course, the student will be able to: • Differentiate Chemical and Physical methods of hydrogen storage (L2) • Discuss the metal organic frame work(L3) • Illustrate the carbon and metal oxide porous structures (L2) • Describe the liquification methods(L2)	
UNIT-IV: **Solar Energy**	8 Hrs
Solar energy introduction and prospects, photovoltaic (PV) technology, concentrated solar power (CSP), Solar Fuels – Hydrogen: Ammonia& Hydrazine, Solar cells (Si-Te& Cd-Te), advantages and disadvantages	
Learning Outcomes: After completing the course, the student will be able to: • Apply the photo voltaic technology (L3) • Demonstrate about solar energy and prospects(L2) • Illustrate the Solar cells (L2). • Discuss about concentrated solar power(L3)	
UNIT-V: **Photochemical and Photo electrochemical Conversions**	7 Hrs
Photochemical cells and applications of photochemical reactions, photo electrochemical cell, advantages of photoelectro catalytic conversions.	
Learning Outcomes: • After completing the course, the student will be able to: • Differentiate between Photo and Photo electrochemical Conversions(L2) • Illustrate the photochemical cells(L2) • Identify the applications of photochemical reactions(L3) • Interpret advantages of photoelectron catalytic conversion(2)	
Text Books:	
1. Bahl and Bahl and Tuli, Essentials of Physical Chemistry, S. Chand Publications, New Delhi, 28th Edition, 2020. 2. US Department of Energy (EG&G technical services and corporation), Fuel Cell Hand Book 7th Edition, 2004.	
Reference Books: 1. Ira N. Levine, Physical chemistry 6th Edition, McGraw Hills Education, New Delhi, 2009. 2. Silver and Atkins, Inorganic Chemistry, , 7th Edition, Oxford University Press, 2018 3. Michael Hirscher, Hand book of Hydrogen Storage: New materials for future energy, storage, Wiley-VCH Verlag GmbH & Co. KGaA, 2010	

4. Klaus Jagar et.al., Solar energy fundamental, technology and systems, UIT-Cambridge publishers, 2016

Course Outcomes:

At the end of this Course the student will be able to

- Understand to perform simultaneous material and energy balances(L1)
- Lists about various electrochemical and energy systems(L1)
- Classify solid, liquid and gaseous fuels(L3)
- Analyze the energy demand of world, nation and available resources to fulfill the demand(L3)
- Evaluate the conventional energy resources and their effective utilization(L3)
- To be able to understand and perform the various characterization techniques of fuels(L1)
- Explain knowledge of modern energy conversion technologies(L2)
- To be able to identify available nonconventional (renewable) energy resources and techniques to utilize them effectively(L1)

B.Tech III Year I Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS)::PULIVENDULA

20ACE55A- BASICS OF CIVIL ENGINEERING

(Open Elective-I)

L	T	P	C
3	0	0	3

Course Objectives:

- To study the basic concept of Civil Engineering and instruction buildings.
- To understand the concept of planning of buildings and drawing of single stored building.
- To study the Basic principles of surveying and instruments used.
- To study about the various materials used for the construction of Buildings.
- To understand the construction of Structural Elements in buildings.

UNIT-I:

Introduction to Civil Engineering Building planning : Introduction to types of buildings as per NBC; Selection of site for buildings. Components of a residential building and their functions. Introduction to industrial buildings – office / factory / software development office / power house /electronic equipment service centre

UNIT-II:

Site plan, Orientation of a building, Open space requirements, Position of doorsand windows, Size of rooms; Preparation of a scaled sketch of the plan of asingle storeyed residential building in a given site plan. Introduction to the various building area terms - Computation of plinth area/ built up area, Floor area / carpet area - for a simple single storeyed building; Setting out of a building.

UNIT-III

Surveying - Principles and objectives of surveying; Horizontal measurements – instruments used – tape, types of tapes; Ranging(direct ranging only) Theodolite and Total station-Principles

UNIT-IV:

Building materials

Bricks, cement blocks - Properties and specifications.

Cement – OPC, properties, grades; other types of cement and its uses (inbrief).

Cement mortar – constituents, preparation.

Concrete – PCC and RCC – grades.

Steel - Use of steel in building construction, types and market forms.

UNIT-V:

Building construction – Foundations; Bearing capacity of soil (definitiononly); Functions of foundations, Types - shallow and deep (sketches only).

Brick masonry – header and stretcher bond, English bonds – Elevation and plan (one brick thick walls only).

Roofs – functions, types, roofing materials (brief discussion only).

Floors – functions, types; flooring materials (brief discussion only).

Decorative finishes – Plastering – Purpose, procedure.

Paints and Painting – Purpose, types, preparation of surfaces for painting (brief discussion only).

Text Books:

- Rangwala, S. C., Essentials of Civil Engineering, Charotar Publishing House
- Rangwala, S. C. and Dalal, K. B., Engineering Materials, Charotar Publishing house
- Rangwala, S. C. and Dalal, K. B., Building Construction, Charotar Publishing house
- Dr. K. R. Arora, "Surveying Volume-I", Standard book house, New Delhi, 13th Edition, 2012. 2. S. K.
- Duggal, "SurveyingVolume-2", Tata McGraw-Hill Education Private Limited, India,New Delhi, 3rd Edition, 2009.

Course Outcomes:

At the end of this Course the student will be able to

- To learn the types of buildings and components of building.
- To get the knowledge of planning of single stored buildings.
- To understand Basic concepts of surveying and Basic uses of instruments in surveying.
- To know the materials used for the construction of Buildings.
- To get the knowledge about the construction methods of Buildings.

B.Tech III Year I Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

BASICS OF NON-CONVENTIONAL ENERGY SOURCES

(Open Elective-I)

L	T	P	C
3	0	0	3

Course Objectives: The objectives of the course are to make the students learn about

- Identify various sources of Energy and the need of Renewable Energy Systems
- Understand the concepts of Solar Radiation, Wind energy and its applications
- Distinguish between solar thermal and solar.PV systems
- Interpret the concept of geo thermal energy and its applications
- Understand the use of biomass energy and the concept of Ocean energy and fuel cells.

UNIT – I: Solar Energy **10 Hrs**

Solar radiation - beam and diffuse radiation, solar constant, earth sun angles, attenuation and measurement of solar radiation, local solar time, derived solar angles, sunrise, sunset and day length. flat plate collectors, concentrating collectors, storage of solar energy thermal storage.

Learning Outcomes:

At the end of this unit, the student will be able to

- To understand about solar thermal parameters
- To distinguish between flat plate and concentrated solar collectors
- To know about thermal storage requirements
- To know about measurement of solar radiation

UNIT – II: PV Energy Systems **10 Hrs**

Introduction, The PV effect in crystalline silicon basic principles, the film PV, Other PV technologies, Electrical characteristics of silicon PV cells and modules, PV systems for remote power, Grid connected PV systems..

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand the concept of PV effect in crystalline silicon and their characteristics
- Understand other PV technologies
- To know about electrical characteristics of PV cells & modules
- To know about grid connected PV systems

UNIT – III: Wind Energy **10 Hrs**

Principle of wind energy conversion; Basic components of wind energy conversion systems; wind mill components, various types and their constructional features; design considerations of horizontal and vertical axis wind machines: analysis of aerodynamic forces acting on wind mill blades and estimation of power output; wind data and site selection considerations

Learning Outcomes:

At the end of this unit, the student will be able to

- To understand basics of wind energy conversion and system
- To distinguish between VAWT and HAWT systems
- To understand about design considerations
- To know about site selection considerations of WECS

UNIT – IV: Geothermal Energy **10 Hrs**

Estimation and nature of geothermal energy, geothermal sources and resources like hydrothermal, geo-pressured hot dry rock, magma. Advantages, disadvantages and application of geothermal energy, prospects of geothermal energy in India..

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand the Geothermal energy and its mechanism of production and its Applications
- Analyze the concept of producing Geothermal energies
- To learn about disadvantages and advantages of Geo Thermal Energy Systems
- To know about various applications of GTES

UNIT – V: Miscellaneous Energy Technologies **10 Hrs**

Ocean Energy: Tidal Energy-Principle of working, performance and limitations. Wave Energy-Principle of working, performance and limitations.

Bio mass Energy: Biomass conversion technologies, Biogas generation plants, Classification, advantages and disadvantages, constructional details, site selection, digester design consideration

Fuel cell: Principle of working of various types of fuel cells and their working, performance and limitations.

Learning Outcomes:

At the end of this unit, the student will be able to

- Analyze the operation of tidal energy
- Analyze the operation of wave energy
- Analyze the operation of bio mass energy
- Understand the principle, working and performance of fuel cell technology
- Apply these technologies to generate power for usage at remote centres

Text Books:

1. Stephen Peake, "Renewable Energy Power for a Sustainable Future", Oxford International Edition, 2018.
2. G. D. Rai, "Non-Conventional Energy Sources", 4th Edition, Khanna Publishers, 2000.

Reference Books:

1. S. P. Sukhatme, "Solar Energy",3rd Edition, Tata Mc Graw Hill Education Pvt. Ltd,2008.
2. B H Khan , " Non-Conventional Energy Resources", 2nd Edition, Tata Mc Graw Hill Education Pvt Ltd, 2011.
3. S. Hasan Saeed and D.K.Sharma,"Non-Conventional Energy Resources",3rd Edition, S.K.Kataria& Sons, 2012.
4. G. N. Tiwari and M.K.Ghosal, "Renewable Energy Resource: Basic Principles and Applications", Narosa Publishing House, 2004.

Course Outcomes:

At the end of this Course the student will be able to

- To distinguish between various alternate sources of energy for different suitable application requirements
- To differentiate between solar thermal and PV system energy generation strategies
- To understand about wind energy system
- To get exposed to the basics of Geo Thermal Energy Systems
- To know about various diversified energy scenarios of ocean, biomass and fuel cells

B.Tech III Year I Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

20AME55a-3D PRINTING

(Open Elective-I)

L	T	P	C
3	0	0	3

Course Objectives: The objectives of the course are to make the students learn about

- Familiarize of additive manufacturing / rapid prototyping and its applications in various fields.
- Impart reverse engineering techniques.
- Explain different processes available in additive manufacturing.
- Bring awareness on mechanical properties of materials and geometric issues related to additive manufacturing applications.

UNIT – I: Introduction to 3D PRINTING Systems: **10 Hrs**

History and Development of 3D printing, Need of 3D Printing, Difference between 3D Printing and CNC, Classification of 3D Printing Processes: Based on Layering Techniques, Raw Materials and Energy Sources, 3D Printing Process Chain, Benefits and Applications of 3D Printing, Representation of 3D model in STL format, RP data formats: SLC, CLI, RPI, LEAF, IGES, CT, STEP, HP/GL.

Learning Outcomes:

At the end of this unit, the student will be able to

- Identify the applications for additive manufacturing processes. **L3**
- Explain the process of additive manufacturing. **L2**
- Represent a 3D model in STL format and other RP data formats to store and retrieve the geometric data of the object. **L3**

UNIT – II: CAD & Reverse Engineering: **8 Hrs**

Basic Concept, Digitization techniques, Model Reconstruction, Data Processing for Additive Manufacturing Technology: CAD model preparation, Part Orientation and support generation, Model Slicing, Tool path Generation, Software's for Additive Manufacturing Technology: MIMICS, MAGICS. Reverse Engineering (RE) –Meaning, Use, RE – The Generic Process, Phase of RE Scanning, Contact Scanners, Noncontact Scanners, Point Processing, Application Geometric Model, Development.

Learning Outcomes:

At the end of this unit, the student will be able to

- Apply various digitalization techniques. **L3**
- Explain the concept of reverse engineering and scanning tools. **L2**

UNIT – III: Solid and Liquid Based AM Systems: **8 Hrs**

Laminated Object Manufacturing (LOM): Principle, Process, Materials, Advantages, Limitations, Applications.

Solid Ground Curing (SGC): Principle, Process, Materials, Advantages, Limitations, Applications.

Fusion Deposition Modeling (FDM): Principle, Process, Materials, Advantages, Limitations, Applications.

Stereo lithography Apparatus (SLA): Principle, Process, Materials, Advantages, Limitations and Applications.

Learning Outcomes:

At the end of this unit, the student will be able to

- Explain the principles, advantages, limitations and applications of solid and liquid based AM systems. **L2**
- Identify the materials for solid and liquid based AM systems. **L3**

UNIT – IV: Powder Based AM Systems: **8 Hrs**

Principle and Process of Selective Laser Sintering (SLS), Advantages, Limitations and Applications of SLS, Principle and Process of Laser Engineered Net Shaping (LENS), Advantages, Limitations and Applications of LENS, Principle and Process of Electron Beam Melting (EBM), Advantages, Limitations and Applications of EBM.

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Learning Outcomes:

At the end of this unit, the student will be able to

- Explain the principles, advantages, limitations and applications of powder based AM systems. **L2**
- Apply SLS, LENS and EBM 3D printing methods. **L3**

UNIT – V: Other Additive Manufacturing Systems: **8 Hrs**

Three Dimensional Printing (3DP): Principle, Process, Advantages, Limitations and Applications. Ballistic Particle Manufacturing (BPM): Principle, Process, Advantages, Limitations, Applications. Shape Deposition Manufacturing (SDM): Principle, Process, Advantages, Limitations, Applications.

Learning Outcomes:

At the end of this unit, the student will be able to

- Explain principles and limitation of 3D printing using BPM and SDM. **L2**
- Use BPM and SDM 3D printing methods. **L3**

Text Books:

1. Ian Gibson, David W. Rosen, Brent Stucker, Additive Manufacturing Technologies: Rapid Prototyping to Direct Digital Manufacturing, 1/e Springer, 2010.
2. Chua C.K., Leong K.F. and Lim C.S., Rapid Prototyping: Principles and Applications, 2/e World Scientific Publishers, 2003.
3. Liou W. Liou, Frank W., Liou, Rapid Prototyping and Engineering Applications: A Tool Box for Prototype Development, CRC Press, 2007.

Reference Books:

1. Pham D.T. and Dimov S.S., Rapid Manufacturing; The Technologies and Application of RPT and Rapid Tooling, Springer, London 2001.
2. Gebhardt A., Rapid prototyping, Hanser Gardener Publications, 2003.
3. Hilton P.D. and Jacobs P.F., Rapid Tooling: Technologies and Industrial Applications, CRC Press, 2005.
4. Rafiq Noorani, Rapid Prototyping: Principles and Applications in Manufacturing, John Wiley & Sons, 2006.

Course Outcomes:

At the end of this Course the student will be able to

- Demonstrate various additive manufacturing and rapid prototyping techniques applications. **L4**
- Describe different additive manufacturing processes. **L3**
- Apply methods in rapid prototyping. **L2**
- Use powder based AM system. **L3**
- Model 3D printing using SDM and BPM methods. **L6**

Online Learning Resources:

- https://www.hubs.com/knowledge-base/introduction-fdm-3d-printing/
- https://slideplayer.com/slide/6927137/
- https://www.mdpi.com/2073-4360/12/6/1334
- https://www.centropiaggio.unipi.it/sites/default/files/course/material/2013-11-29%20-%20FDM.pdf
- https://lecturenotes.in/subject/197
- https://www.cet.edu.in/noticefiles/258_Lecture%20Notes%20on%20RP-ilovepdf-compressed.pdf
- https://www.vssut.ac.in/lecture_notes/lecture1517967201.pdf
- https://www.youtube.com/watch?v=NkC8TNts4B4

B.Tech III Year I Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

20AME55b-SMART MATERIALS

(Open Elective-I)

L	T	P	C
3	0	0	3

Course Objectives: The objectives of the course are to make the students learn about

- Familiarize the smart materials and its role in developing intelligent systems.
- Introduce the students with HBLS and LBHS smart materials.
- Expose the students in smart systems development and uses.
- Understand the working principle of smart actuators and smart sensors.

UNIT – I: Introduction to Smart Materials: **10 Hrs**

Introduction to Smart Materials: What is Intelligence? Artificial intelligence Vs. embedded Intelligence, Definition of smart material, need for smart materials, classifications of smart systems, components of a smart systems, smart system applications, the role of Smart Materials in developing Intelligent Systems and Adaptive Structures.

Learning Outcomes:

At the end of this unit, the student will be able to

- Recall what intelligence is. **L1**
- Define smart materials. **L1**
- Describe the role of smart materials in development of intelligent systems and adaptive structures. **L2**
- Illustrate the applications of smart systems. **L2**

UNIT – II: High bandwidth - Low strain generating (HBLS) Smart Materials: **8 Hrs**

High bandwidth - Low strain generating (HBLS) Smart Materials:

Piezoelectric Materials – constitutive relationship, electromechanical coupling coefficients, piezoelectric constants, piezoceramic materials, variation of coupling coefficients in hard and soft piezoceramics, polycrystalline vs single crystal piezoelectric materials, polyvinyldene fluoride, piezoelectric composites.

Magnetostrictive Materials – constitutive relationship, magneto-mechanical coupling coefficients, Joule Effect, Villari Effect, Matteuci Effect, Wiedemann effect, Giant magnetostriction in Terfenol-D, Terfenol-D particulate composites, Galfenol and Metglas materials.

Learning Outcomes:

At the end of this unit, the student will be able to

- Describe the constitutive relationship of piezoelectric materials. **L2**
- Compare polycrystalline and single crystal piezeoelectric materials. **L2**
- Explain concepts of Joule effect, Villari effect, Matteuci effect, Wiedemann effect. **L2**
- Discus Galfenol and Metglas materials. **L6**

UNIT – III: Low bandwidth - High strain generating (LBHS) materials: **8 Hrs**

Low bandwidth - High strain generating (LBHS) materials: Shape Memory Alloys (SMA) – Introduction, Phenomenology, Influence of stress on characteristic temperatures, Modelling of shape memory effect. Vibration control through shape memory alloys. Design considerations, multiplexing embedded NiTiNOL actuators. Electro-active Polymers (EAP)- Introduction, Phenomenology, Influence of stress on characteristic temperatures.

Learning Outcomes:

At the end of this unit, the student will be able to

- List various types of LBHS smart materials. **L2**
- Identify the influence of stress on characteristic temperatures in SMA and EAP. **L3**
- Explain the concept of vibration control through shape memory alloys. **L2**
- Discus design considerations of shape memory alloy. **L6**

UNIT – IV: Smart actuator: **8 Hrs**

Smart actuators:

Based on HBLS smart materials: Piezoelectric Actuators – Induced Strain actuation model, Unimorph and Bimorph Actuators, Actuators embedded in composite laminate, Impedance matching in actuator design, Feedback Control, Pulse Drive, Resonance Drive. Magnetostrictive Actuators – Magnetostrictive Mini Actuators, Thermal instabilities, Discretely distributed actuation, Manetostrictive Composites.

Based on LBHS Smart Materials - Shape Memory Alloy based actuators for Shape Control, Electro-active Polymers for Work-Volume Generation.

Learning Outcomes:

At the end of this unit, the student will be able to

- Recall working principle of actuators. **L1**
- Explain impedance matching in actuator design, feedback control, pulse drive and resonance. **L2**
- Describe the working principle of Piezoelectric Actuators & Magnetostrictive Actuators. **L2**
- Discus the concepts of actuators based on HBLS and LBHS. **L6**

UNIT – V: Smart sensors: **8 Hrs**

Smart sensors:

Sensors based on HBLS Smart Materials - Piezoelectric Sensors, Magnetostrictive Sensors, Techniques of Self Sensing MEMS Sensors.

Sensors based on LBHS Smart Materials - EAP based sensors, SMA based encoders, Optical Fibre based Sensing.

Learning Outcomes:

At the end of this unit, the student will be able to

- Select the type of sensor required for smart systems. **L1**
- Explain techniques of self sensing MEMS sensors. **L2**
- discus EPA based and SMA based sensors. **L6**
- Explain optical based sensing system. **L2**

Text Books:

1. M.V. Gandhi, B.D. Thompson" Smart Materials and Structures" Springer Science & Business Media, 31.
2. A.V. Srinivasan, Smart Structures; Analysis and Design, Cambridge University Press, Cambridge; New York, 2001
3. K.Uchino, Kluwer, Piezoelectric Actuators and ultrasonic Motors Academic Publishers, Boston, 1997.

Reference Books:

1. Brian Culshaw, Smart Structures and Materials, Artech House, Boston,2000.
2. Gauenzi, P., Smart Structures, Wiley, 2009.
3. Cady, W. G., Piezoelectricity, Dover Publication.
4. A.J. Moulson and J.M-Herbert, Electro ceramics: Materials, Properties/ / Wiley/ 2/e.

Course Outcomes:

At the end of this Course the student will be able to

- Describe the role of smart materials in development of intelligent systems and adaptive structures. **L2**
- Compare polycrystalline and single crystal piezoelectric materials. **L2**
- Identify the influence of stress on characteristic temperatures in SMA and EAP. **L3**
- Explain techniques of self sensing MEMS sensors. **L2**

Online Learning Resources:

- https://nptel.ac.in/courses/112104251
- http://wwwcourses.sens.buffalo.edu/mae538/LecNotes.html
- http://ssdl.iitd.ac.in/vssdl/smart.pdf
- https://www.stem.org.uk/resources/elibrary/resource/33044/smart-materials-1

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JNTUA College of Engineering,

B.Tech IV Year I Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

20AEC55a- FUNDAMENTALS OF ELECTRONICS AND COMMUNICATION ENGINEERING

(Open Elective-I)

L – T – P – C
3 – 0 – 0 – 3

Course Objectives:

- To study the basic principle, construction and operation of semiconductor devices.
- To learn the real time applications of semiconductor devices.
- To introduce binary number systems, logic gates and digital logic circuits.
- To get an idea about the basic principles of communication systems and their applications.
- To learn the measurement of physical parameters using Sensors and Transducers.

UNIT I

Introduction to Electronics Engineering: Overview, scope and objective of studying Electronics Engineering. Introduction to semiconductor devices: Bond structure of semiconductors, intrinsic and extrinsic semiconductors; Basic principle and operation of semiconductor devices – diode, bipolar junction transistor, field effect transistors; Introduction to VLSI.

Learning Outcomes:

At the end of the unit, the student will be able to:

- Understand the basic principle, construction and operation of semiconductor devices.(L2)
- Learn about the diode, bipolar junction transistor and field effect transistors.(L1)

UNIT II

Applications of semiconductor devices: Basic concepts of rectifiers, voltage regulators, amplifiers and oscillators; Basic concepts of operational amplifier and their applications.

Learning Outcomes:

At the end of the unit, the student will be able to:

- To learn the real time applications of semiconductor devices.(L1)
- To understand the basic concepts of operational amplifier and their applications.(L2)

UNIT III

Introduction to digital systems: Binary number system, Boolean algebra, Logic gates, adders, one-bit memory, flip-flops (SR, JK), shift registers, Asynchronous counter.

Learning Outcomes:

At the end of the unit, the student will be able to:

- Understand the binary number systems, Boolean algebra and working of logic gates.(L2)
- Know the working and applications of digital logic circuits.(L1)

UNIT IV

Introduction to Communication Systems: Elements of a communication system – transmitter and receiver; Signal types in communication; FDM and TDM; Processing of signals for transmission – basic concepts of amplitude and frequency modulation; Examples of telecommunication systems – telephone, radio, television, mobile communication and satellite communication.

Learning Outcomes:

At the end of the unit, the student will be able to:

- Identify the basic elements of a communication system.(L2)
- Understand various examples of telecommunication systems.(L2)

UNIT V

Sensors and Transducers - Active and passive transducers: Measurement of displacement (Resistance, capacitance, inductance; LVDT) Force (strain gauges) Pressure (piezoelectric transducers) Temperature (resistance thermometers, thermocouples and thermistors), Velocity, Acceleration, Vibration, pH measurement Signal Conditioning Circuits.

Learning Outcomes:

At the end of the unit, the student will be able to:

- Understand the basic working principle and applications of different sensors and transducers.(L2)
- Measure physical parameters using different types of sensors and transducers.(L3)

TEXT BOOKS

1. Millman J, Halkias C.C andJit S, "Electronic Devices and Circuits", Tata McGraw-Hill, 2nd 2007 Edition.
2. Mano M.M., "Digital Design", Prentice-Hall, 3rd Edition. 2002
3. A.K. Sawhney, "A course in Electrical and Electronics Measurements and Instrumentation",DhanpatRai& Co. 3rd edition Delhi, 2010.
4. Kennedy G. and Davis B., "Electronic Communication Systems", Tata McGraw-Hill, 4th 2008 Edition.

REFERENCE BOOKS

1. Tomasi W., "Advanced Electronic Communication Systems", Pearson/Prentice-Hall, 6th 2004 Edition.
2. Boylstead R.L. andNashelsky L., "Electronic Devices and Circuit Theory", Pearson, 10th 2009 Edition.

Course outcomes:

At the end of this course, the students will be able to

- Understand the basic principle, construction and operation of semiconductor devices.(L2)
- Learn the real time applications of semiconductor devices.(L1)
- Comprehend the binary number systems, logic gates and digital logic circuits.(L1)
- Understand the basic principles of communication systems and their applications.(L2)
- Measure the physical parameters using Sensors and Transducers.(L3)

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

20AEC55b- TRANSDUCERS AND SENSORS

(Open Elective-I)

L-T - P - C
3 - 0 - 0 - 3

Course Objectives:

- To study about the characteristics of instrumentation system and transducers.
- To know the operation of different types of Temperature Transducers.
- To learn the operation of different types of Flow Transducers.
- To understand the working and operation of different types of Pressure Transducers.
- To gain the knowledge on working of Force and Sound Transducers.

UNIT I

Introduction: General Configuration and Functional Description of measuring instruments, Static and Dynamic Characteristics of Instrumentation System, Errors in Instrumentation System, Active and Passive Transducers and their Classification.

Motion Transducers: Resistive strain gauge, LVDT, RVDT, Capacitive transducers, Piezo-electric transducers, seismic displacement pick-ups, vibrometers and accelerometers.

Learning Outcomes:

At the end of the unit, the student will be able to:

- Learn the characteristics of instrumentation system and transducers.(L1)
- Measure motion using different motion transducers.(L3)

UNIT II

Temperature Transducers: Standards and calibration, fluid expansion and metal expansion type transducers - bimetallic strip, Thermometer, Thermistor, RTD, Thermocouple and their characteristics.

Hall effect transducers, Digital transducers, Proximity devices, Bio-sensors, Smart sensors, Piezo-electric sensors.

Learning Outcomes:

At the end of the unit, the student will be able to:

- Understand the working principle of temperature transducers.(L2)
- Study about different types of bio sensors and smart sensors.(L1)

UNIT III

Flow Transducers: Bernoulli's principle and continuity, Orifice plate, Nozzle plate, Venture tube, Rotameter, Anemometers, Electromagnetic flow meter, Impeller meter and Turbid flow meter.

Learning Outcomes:

At the end of the unit, the student will be able to:

- Understand the Bernoulli's principle and continuity.(L2)
- Learn how to measure flow using different types of flow meters.(L1)

UNIT IV

Pressure Transducers: Standards and calibration, different types of manometers, elastic transducers, diaphragm bellows, bourdon tube, capacitive and resistive pressure transducers, high and low pressure measurement.

Learning Outcomes:

At the end of the unit, the student will be able to:

- Work with different types of manometers.(L3)
- Use different types of pressure transducersto measure pressure.(L3)

UNIT V

Force and Sound Transducers: Proving ring, hydraulic and pneumatic load cell, dynamometer and gyroscopes. Sound level meter, sound characteristics, Microphone.

Learning Outcomes:

At the end of the unit, the student will be able to:

- Learn how to measure force using force transducers.(L1)
- Understand the working and operation of sound transducers.(L2)

TEXT BOOKS

1. A.K. Sawhney, "A course in Electrical and Electronics Measurements and Instrumentation", DhanpatRai& Co. 3rd edition Delhi, 2010.
2. Rangan C.S. Sarma G.R and Mani V S V, "Instrumentation Devices and Systems", TATA McGraw Hill publications. 2007.

REFERENCE BOOKS

1. Doebelin. E.O, "Measurement Systems Application and Design", McGraw Hill International, New York, 2004.
2. Nakra B.CandChaudharyK.K , "Instrumentation Measurement and Analysis", Second Edition, Tata McGraw-Hill Publication Ltd.2006.

Course outcomes:

At the end of this course, the students will be able to

- Understand the characteristics of instrumentation system and transducers.(L2)
- Know the operation of different types of Temperature Transducers.(L1)
- Compare the operation of different types of Flow Transducers.(L2)
- Correlate the working and operation of different types of Pressure Transducers.(L4)
- Gain the knowledge on working of Force and Sound Transducers.(L1)

B.Tech III Year I Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

20ACS55A- Fundamentals of Internet of Things

(Open Elective-I)

L	T	P	C
3	0	0	3

Course objectives:

- To understand the fundamentals of Internet of Things.
- To build a small low cost embedded system using Arduino / Raspberry Pi or equivalent boards.
- To apply the concept of Internet of Things in the real world scenario.

UNIT I : Fundamentals of IoT

Introduction – Characteristics-Physical Design – IoT Protocols – Logical Design – Enabling technologies – IoT Levels – Six Levels of IoT - Domain Specific IoTs.

Learning Outcome:

At the end of this unit, students will able to

- Describe the IoT devices physical design and able to design IoT devices in various levels of IoT L1
- Explain the technologies enabling related to industry. L2

UNIT II: IOT and M2M

Software defined networks, network function virtualization, difference between SDN and NFV for IoT Basics of IoT System Management with NETCONF, YANG- NETCONF, YANG, SNMP, NETOPEER.

Learning Outcome:

At the end of this unit, students will able to

- Describe the Software defined networks and Network function virtualization with respect to the IoT systems. L2
- Explain the NETCONF protocol with YANG modeling language. L2

UNIT III: IoT Design Methodology

IoT Systems Management – IoT Design Methodology – Specifications Integration and Application Development.

Learning Outcome:

At the end of this unit, students will able to

- Describe the IoT devices complete design methodology with all spectifications. L2
- Explain the system Integration and application development and deployment.L3 L3

UNIT IV: Sensors and Connectivity

Sensors- Types of sensor nodes, Internet communications, IP addresses, MAC Address, TCP and UDP Ports, Application layer protocols

Learning Outcome:

At the end of this unit, students will able to

- Describe various sensors usage with respect to the IoT systems and differentiation between IP address and MAC address L3
- Explain the benefits of application layer protocols. L4

UNIT V: IOT Industry Applications

Cisco IoT system - IBM Watson IoT platform – Manufacturing - Converged Plant wide Ethernet Model (CPwE) – Power Utility Industry – Grid Blocks Reference Model - Smart and Connected Cities: Layered architecture, Smart Lighting, Smart Parking Architecture and Smart Traffic Control

Learning Outcome:

At the end of this unit, students will able to

- Describe the industry oriented IoT devices and its applications. L4

TEXT BOOKS:

2. Arshdeep Bahga, Vijay Madisetti, "Internet of Things – A Hands-on Approach", Universities Press, 2015.
3. David Hanes, Gonzalo Salgueiro, Patrick Grossetete, Rob Barton and Jerome Henry, —IoT Fundamentals: Networking Technologies, Protocols and Use Cases for Internet of Things, Cisco Press, 2017

REFERENCES:

4. Manoel Carlos Ramon, "Intel® Galileo and Intel® Galileo Gen 2: API Features and Arduino Projects for Linux Programmers", Apress, 2014.
5. Marco Schwartz, "Internet of Things with the Arduino Yun", Pack Publishing, 2014.
6. *Simon Monk, "Programming the Raspberry Pi: Getting Started with Python"*, McGraw-Hill, *2013.*
7. CharalamposDoukas,"Building Internet of Things With the Arduino", Second Edition, 2012.
8. Dr.John Bates, "Thingalytics: Smart Big Data Analytics for the Internet of Things", Software AG Publisher, 2015.

Course Outcomes:

- Interpret the impact and challenges posed by IoT networks leading to new architectural models. L2
- Appraise the role of IoT protocols for efficient network communication. L3
- Illustrate different sensor technologies for sensing real world entities and identify the

B.Tech III Year I Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

20ACS55B-E-Marketing
(Open Elective-I)

L	T	P	C
3	0	0	3

Course Objectives: The objectives of the course are to make the students learn about

I. Understand the legal and ethical issues in e-marketing.

II. Analyze online marketing and supply chain management.

III. Provides extensive theoretical and practical knowledge of online marketing.

IV. Develop marketing skills required for a continuously growing international business environment.

UNIT – I: E-BUSINESS OVERVIEW :

Traditional commerce vs. e-commerce, e-commerce and e-business categories of e-commerce development and growth of e-commerce advantages and disadvantages of e-commerce international nature of e-commerce..

Learning Outcomes:

At the end of this unit, the student will be able to

To realize basics of E-Marketing. L1

To introduce different E-Business Models . L2

UNIT – II: E-BUSINESS INFRASTRUCTURE :

E Commerce architectural framework, the internet and www-internet protocols, internet, intranet and extranets, internet connection options, security issues in e commerce environment, encryption techniques payment systems types of payments legal, ethical and tax issues in e-commerce.

Learning Outcomes:

At the end of this unit, the student will be able to

To understand the E-Marketing Plan. L2

To know about Online Expression . L3

UNIT – III: ONLINE MARKETING AND SUPPLY CHAIN MANAGEMENT

Online marketing, business models of e marketing, online advertisement, advertisement methods and strategies online retailing e-auctions.Supply chain management-procurement process and the supply chain types of procurement, multi-tier supply chains and trends in supply chain management.

Learning Outcomes:

At the end of this unit, the student will be able to

To know about the Data Drive Strategy . L6

Gain knowledge on Consumer Behavior Online L3

UNIT – IV: ONLINE SERVICES :

Online financial services, online banking and brokerage, online insurance services, online real estate services, travel services online, hospitality services online, recruitment services online, publishing services online entertainment, e-learning.

Learning Outcomes:

At the end of this unit, the student will be able to

To know about Pricing Strategies **L4**

To know about Channel Management and Power. **L6**

UNIT – V: MOBILE COMMERCE :

Definition of mobile commerce, mobile commerce framework, growth of mobile commerce benefits and limitations of mobile commerce mobile network infrastructure, information distribution for mobile networks multimedia content, publishing, mobile payment models, mobile commerce applications.

Learning Outcomes:

At the end of this unit, the student will be able to

To know how Browsing Behavior Model **L4**

To know about Ten rules for CRM Success. **L2**

Text Books:

1. Gary P. Schneider, "Ecommerce-Strategy, Technology and Implementation", Cengage Learning, India Edition

2. Kenneth C. Laudon, Carol GuercioTraver, "E-commerce–Business", Technology, Pearson, Low Price Edition.

3. Bharat Bhasker, "Electronic Commerce Framework, Technologies and Applications", 3rdn Edition.Tata McGraw, Hill.

Reference Books:

1. Efraim Turban, Tae Lee, David King and H. Micheal Chung, "Electronic Commerce, Managerial Perspective", Pearson Education Asia.
2. CSV Murthy, "E-commerce-Concepts, Models and Strategies", HPH.
3. . J. Christopher Westland and Theodore H K Clark, "Global Electronic Commerce ,Theory and Case Studies", Oxford Universities Press.

Course Outcomes:

At the end of this Course the student will be able to

- Analyse the confluence of marketing, operations, and human resources in real-time delivery. **L3**
- Explain emerging trends in digital marketing and critically assess the use of digital marketing tools by applying relevant marketing theories and frameworks. **L3**
- Investigate and evaluate issues in adapting to globalised markets that are constantly changing and increasingly networked. **L5**
- Investigate and evaluate issues in adapting to globalised markets that are constantly changing and increasingly networked. **L2**
- Demonstrate cognitive knowledge of the skills required in conducting online research and research on online markets, as well as in identifying, assessing and selecting digital market opportunities. **L3**

B.Tech III Year I Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

20ACS55C-Computer Architecture and Organization

(Open Elective-I)

L	T	P	C
3	0	0	3

Course Objectives: The objectives of the course are to make the students learn about

- To impart basic concepts of computer architecture and organization.
- To explain key skills of constructing cost-effective computer systems.
- To familiarize the basic CPU organization.
- To help students in understanding various memory devices.

UNIT – I: STRUCTURE OF COMPUTERS:

Computer types, Functional units, Basic operational concepts, VonNeumann Architecture, Bus Structures, Software, Performance, Multiprocessors and Multicomputer, Data representation, Fixed and Floating point, Error detection and correction codes.

COMPUTER ARITHMETIC: Addition and Subtraction, Multiplication and Division algorithms, Floating-point Arithmetic Operations, Decimal arithmetic operations.

Learning Outcomes:

At the end of this unit, the student will be able to

To realize basics of computer structure. L1

To know about the arithmetic operations. L2

UNIT – II: BASIC COMPUTER ORGANIZATION AND DESIGN:

Instruction codes, Computer Registers, Computer Instructions and Instruction cycle. Timing and Control, Memory-Reference Instructions, Input-Output and interrupt. Central processing unit: Stack organization, Instruction Formats, Addressing Modes, Data Transfer and Manipulation, Complex Instruction Set Computer (CISC) Reduced Instruction Set Computer (RISC), CISC vs RISC.

Learning Outcomes:

At the end of this unit, the student will be able to

To understand the organization of computer. L2

To know about design of the computer. L3

UNIT – III:REGISTER TRANSFER AND MICRO-OPERATIONS

REGISTER TRANSFER AND MICRO-OPERATIONS: Register Transfer Language, Register Transfer, Bus and Memory Transfers, Arithmetic Micro-Operations, Logic Micro-Operations, Shift Micro-Operations, Arithmetic logic shift unit.

MICRO-PROGRAMMED CONTROL: Control Memory, Address Sequencing, Micro-Program example, Design of Control Unit.

Learning Outcomes:
At the end of this unit, the student will be able to
To know about the registers and its operations. L6

Gain knowledge on Micro operations. L3

UNIT – IV:MEMORY SYSTEM

MEMORY SYSTEM: Memory Hierarchy, Semiconductor Memories, RAM(Random Access Memory), Read Only Memory (ROM), Types of ROM, Cache Memory, Performance considerations, Virtual memory, Paging, Secondary Storage, RAID.

Learning Outcomes:
At the end of this unit, the student will be able to
To know about Semiconductor Memories L4

To know about the Cache Memory L6

UNIT – V: INPUT OUTPUT

INPUT OUTPUT: I/O interface, Programmed IO, Memory Mapped IO, Interrupt Driven IO, DMA.
MULTIPROCESSORS: Characteristics of multiprocessors, Interconnection structures, Inter Processor Arbitration, Inter processor Communication and Synchronization, Cache Coherence.

Learning Outcomes:
At the end of this unit, the student will be able to
To know about the Input/Output operations L4

To know about the multiprocessors. L2

Text Books:

1. M. Moris Mano (2006), Computer System Architecture, 3rd edition, Pearson/PHI, India.

Reference Books:

1. Carl Hamacher, Zvonks Vranesic, SafeaZaky (2002), Computer Organization, 5th edition, McGraw Hill, New Delhi, India.

2.William Stallings (2010), Computer Organization and Architecture- designing for performance, 8th edition, Prentice Hall, New Jersy

3.Anrew S. Tanenbaum (2006), Structured Computer Organization, 5th edition, Pearson Education Inc,

4.John P. Hayes (1998), Computer Architecture and Organization, 3rd edition, Tata McGrawHill

Course Outcomes:

At the end of this Course the student will be able to

- Identify various components of computer and their interconnection. L3
- Identify basic components and design of the CPU: the ALU and control unit. L3
- Compare and select various Memory devices as per requirement. L5
- Compare various types of IO mapping techniques. L2
- Critique the performance issues of cache memory and virtual memory. L3

B.Tech III Year II Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

20AEC61- DIGITAL SIGNAL PROCESSING

L–T – P - C
3 – 0 – 0 – 3

Course Objectives:

- To learn the basic properties of signal &systems and Discrete Fourier Transform.
- To understand different types of Fast Fourier transform(FFT)algorithms.
- To design simple finite impulse response filters and analyzestheir stability.
- To gain knowledge of various structures used in implementation of FIR and IIR filters.
- To grasp the importance and applications of Multirate Digital signal processing.

UNIT-I

Introduction: Review of discrete-time signals and systems–Time domain analysis of discrete-time signals & systems, Frequency domain analysis of discrete-time signals and systems.

Discrete Fourier Transform: Frequency-domain sampling and reconstruction of discrete-time signals, Discrete Fourier Transform (DFT), The DFT as a linear transformation, Relationship of the DFT to other transforms, Properties of DFT, Linear filtering methods based on DFT, Frequency analysis of signals using the DFT.

Learning Outcomes:

At the end of the unit, the student will be able to:

- Learn the basics of signals and systems and Discrete Fourier Transform(L1)
- Represent the signals and systems in both time domain and frequency domain.(L1)

UNIT-II

Fast Fourier Transform Algorithms : Fast Fourier transforms (FFT)-Radix2 decimation in time and decimation in frequency FFT algorithms, inverse FFT and FFT for composite N, Applications of FFT algorithms – Efficient computation of the DFT of two real sequences, 2N point real sequences, Use of the FFT algorithm in linear filtering and correlation, Quantization errors in the computation of DFT.

Learning Outcomes:

At the end of the unit, the student will be able to:

- Apply FFT algorithms for various applications.(L3)
- Compare the Quantization errors in the computation of DFT.(L2)

UNIT-III

Implementation of Filter structures: Overview of Z-transform, Structures for IIR systems – Direct form, Signal flow graphs & Transposed, Cascade form, Parallel form and Lattice structures, Conversion from Lattice structure to direct form, lattice –Ladder structure. Structures for the realization of discrete-time systems, Structures for FIR systems - Direct form, Cascade form, Frequency sampling, and Lattice structures

Learning Outcomes:

At the end of the unit, the student will be able to:

- Understand the importance of Z-transform(L2)
- Design the Structures for IIR and FIR systems(L6)

UNIT-IV

Design of Digital Filters: General considerations–Causality and its implications, Characteristics of practical Frequency Selective Filters,

Design of IIR filters from analog filters–IIR filter design: approximation of derivatives, Impulse invariance method and bilinear transformation method, Frequency transformation in the analog and digital domains, Illustrative problems.

Design of FIR filters–Symmetric and asymmetric FIR filters, Design of linear phase FIR filters: using windows, using frequency sampling method.

Learning Outcomes:

At the end of the unit, the student will be able to:

- Analysethe characteristics of practical Frequency Selective Filters(L4)
- Design IIR and FIR filters(L6)

UNIT-V

Multirate Digital Signal Processing: Introduction, Decimation, and interpolation, Sampling rate conversion by a rational factor, Implementation of sampling rate conversion, Multistage implementation of sampling rate conversion, Sampling rate conversion of bandpass signals, Sampling rate conversion by arbitrary factor, Applications of multirate signal processing.

Learning Outcomes:

At the end of the unit, the student will be able to:

- Gain knowledge about Decimation, Interpolation and Sampling rate conversion.(L1)
- Understand the applications of multirate signal processing(L2)

TEXT BOOKS:

1. John G. Proakis and Dimitris G. Manolakis, "Digital signal processing, principles, Algorithms and applications", 4th Edition, Pearson Education, 2007.
2. Emmanuel C. Ifeachor and Barrie W. Jervis, "Digital Signal Processing: A Practical Approach",4nd Edition, Pearson Education, 2002.

REFERENCES:

1. Sanjit K Mitra, "Digital Signal Processing, A computer base approach", 3rd Edition, Tata McGraw Hill, 2009.
2. A. Anand Kumar, "Digital Signal Processing", 2nd Edition, PHI Learning, 2011

Course Outcomes:

At the end of this course, the students will be able to

- Learn the basic properties of signal & systems and Discrete Fourier Transform.(L1)
- Understand different types of Fast Fourier transform(FFT)algorithms.(L2)
- Design simple finite impulse response filters and analyze their stability.(L6)
- Analyze various structures used in implementation of FIR and IIR filters.(L4)
- Grasp the importance and applications of Multirate Digital signal processing.(L1)

B.Tech III Year II Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

20AEC62- MICROWAVE ENGINEERING

L–T – P - C
3 – 0 – 0 – 3

Course Objectives:

- To analyze different modes in rectangular and circular waveguides and resonators
- To study and analyze various microwave components.
- To understand the principles of different microwave sources
- To gain knowledge on microwave semiconductor devices.
- To learn how to do different microwave measurements.

UNIT-I

Waveguides & Resonators: Introduction, Microwave spectrum and bands, applications of Microwaves, Rectangular Waveguides-Solution of Wave Equation in Rectangular Coordinates, TE/TM mode analysis, Expressions for fields, Cutoff frequencies, filter characteristics, dominant and degenerate modes, sketches of TE and TM mode fields in the cross-section, Mode characteristics - Phase and Group velocities, wavelengths and impedance relations, Circular Waveguides - Dominant mode (qualitative treatment only), Rectangular Waveguides – Power Transmission and Power Losses, Impossibility of TEM Modes, losses, Q-factor, Cavity resonators-introduction, Rectangular and cylindrical cavities, dominant modes and resonant frequencies, Q-factor and coupling coefficients, Illustrative Problems.

Learning Outcomes:

At the end of the unit, the student will be able to:

- Learn about Rectangular Waveguidesand resonators.(L1)
- Analyze different modes in rectangular and circular waveguides and resonators.(L4)

UNIT-II

Waveguide Components: Scattering Matrix - Significance, Formulation and properties, Coupling mechanisms - Probe, Loop, Aperture types, Wave guide discontinuities - waveguide Windows, tuning screws and posts, matched loads, Waveguide attenuators - Resistive card, rotary vane Attenuators, waveguide phase shifters-dielectric, rotary vane phase shifters, Wave guide multiport junctions - E plane and H plane Tees, Magic Tee, Directional couplers-2 hole, Bothe hole types, Ferrites-composition and characteristics, Faraday rotation, Ferrite components - Gyrator, Isolator, Circulator, S Matrix calculations for 2-port junction, E plane and H plane Tees, Magic Tee, Directional coupler, circulator and Isolator, Illustrative Problems.

Learning Outcomes:

At the end of the unit, the student will be able to:

- Understand Scattering matrix formulation and properties.(L2)
- Learn the working and applications of different microwave components.(L1)

UNIT-III

Linear beam Tubes: Limitations and losses of conventional tubes at microwave frequencies, Classification of Microwave tubes, O type tubes - 2 cavity klystrons-structure, Reentrant cavities, velocity modulation process and Applegate diagram, bunching process and small signal theory-Expressions for o/p power and efficiency, Reflex Klystrons-structure, Velocity Modulation, Applegate diagram, mathematical theory of bunching, power output, efficiency, oscillating modes and o/p characteristics, Effect of Repeller Voltage on Power o/p, Significance, types and characteristics of slow wave structures, structure of TWT and amplification process (qualitative treatment), Suppression of oscillations, Gain considerations.

Learning Outcomes:

At the end of the unit, the student will be able to:

- Understand different 'O' type microwave tube structures.(L2)
- Learn the principles and working of different microwave sources.(L1)

UNIT - IV

Cross-field Tubes & Microwave Semiconductor Devices: Introduction, Cross field effects, Magnetrons-different types, cylindrical travelling wave magnetron-Hull cutoff and Hartree conditions, modes of resonance and PI-mode operation, separation of PI-mode, O/P characteristics, Introduction to Microwave semiconductor devices, classification, applications, Transfer Electronic Devices, Gunn diode - principles, RWH theory, Characteristics, Basic modes of operation - Gunn oscillation modes, LSA Mode, Varactor diode, Parametric amplifier, Introduction to Avalanche Transit time devices (brief treatment only), Illustrative Problems.

Learning Outcomes:

At the end of the unit, the student will be able to:

- Understand cross field effects and working of cross field microwave tubes.(L2)
- Analyze the characteristics of microwave semiconductor devices.(L4)

UNIT-V

Microwave Measurements: Description of Microwave bench-different blocks and their features, errors and precautions, Microwave power measurements, Measurement of attenuation, frequency, VSWR (low, medium, high), Measurement of 'Q' of a cavity, Impedance measurements.

Learning Outcomes:

At the end of the unit, the student will be able to:

- Understand microwave bench setup and precautions to be taken while doing microwave measurements.(L2)
- Explain different microwave measurements.(L1)

TEXT BOOKS:

1. Samuel Y. Liao, "Microwave devices and circuits", 3rd Edition, Pearson Publishing, 2003.
2. R. E. Collin, "Foundations for microwave engineering", 2nd Edition, John Wiley, 2002.

REFERENCES:

1. G.S.N Raju, "Microwave Engineering", 2nd Edition, IK International Publications 2008.
2. M. Kulkarni, "Microwave and Radar Engineering", Umesh Publications, 4th edition 2009.

Course Outcomes:

At the end of this course, the students will be able to

- Analyze different modes in rectangular and circular waveguides and resonators(L4)
- Explain the working of various microwave components.(L1)
- Understand the principles of microwave sources(L2)
- Compare the performance of various microwave semiconductor devices.(L2)
- Explain how to do different microwave measurements.(L1)

B.Tech III Year II Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

20AEC63- VLSI DESIGN

L–T – P - C
3 – 0 – 0 – 3

Course Objectives:

- To give exposure to different steps involved in the fabrication of ICs and electrical properties of MOS devices.
- To know the design rules in drawing the layout of any logic circuit.
- To design different types of logic gates using CMOS inverter and analyze their transfer characteristics.
- To learn the concepts to design building blocks of data path of any system using gates.
- Understand basic programmable logic devices and testing of CMOS circuits.

UNIT I

Introduction: Introduction to IC Technology – MOS, PMOS, NMOS, CMOS &BiCMOS

Basic Electrical Properties: Basic Electrical Properties of MOS and BiCMOS Circuits: Ids-Vds relationships, MOS transistor threshold Voltage, gm, gds, Figure of merit ωo; Pass transistor, NMOS Inverter, Various pull ups, CMOS Inverter analysis and design, Bi-CMOS Inverters.

Learning Outcomes:

At the end of the unit, the student will be able to:

- Understand different steps involved in the fabrication of ICs and electrical properties of MOS devices. (L2)
- Summarize the operation of NMOS, CMOS and BiCMOS inverters.(L2)

UNIT II

VLSI Circuit Design Processes: VLSI Design Flow, MOS Layers, Stick Diagrams, Design Rules and Layout, 2 μm CMOS Design rules for wires, Contacts and Transistors Layout Diagrams for NMOS and CMOS Inverters and Gates, Scaling of MOS circuits.

Learning Outcomes:

At the end of the unit, the student will be able to:

- Know the VLSI design flow and stick diagrams.(L1)
- Understand the design rules in drawing the layout of any logic circuit.(L2)

UNIT III

Gate Level Design: Logic Gates and Other complex gates, Switch logic, Alternate gate circuits, Time delays, Driving large capacitive loads, Wiring capacitance, Fan – in, Fan – out, Choice of layers.

Learning Outcomes:

At the end of the unit, the student will be able to:

- Understand different types of logics in gate level design.(L2)
- Learn and compare different performance parameters in gate level design.(L1)

UNIT IV

Data Path Subsystems: Subsystem Design, Shifters, Adders, ALUs, Multipliers, Parity generators, Comparators, Zero/One Detectors, Counters.

Array Subsystems: SRAM, DRAM, ROM, Serial Access Memories.

Learning Outcomes:

At the end of the unit, the student will be able to:

- Describe the building blocks of data path of any system using gates.(L1)
- Summarize different types of Semiconductor memories. (L2)

UNIT V

Programmable Logic Devices: PLAs, FPGAs, CPLDs, Standard Cells, Programmable Array Logic, Design Approach, Parameters influencing low power design.

CMOS Testing: CMOS Testing, Need for testing, Test Principles, Design Strategies for test, Chip level Test Techniques.

Learning Outcomes:

At the end of the unit, the student will be able to:

- Explain different programmable logic devices.(L1)
- Understand the testing processes of CMOS circuits.(L2)

Text Books:

1. Kamran Eshraghian, EshraghianDougles and A. Pucknell, "Essentials of VLSI circuits and systems", PHI, 2005 Edition
2. Neil H. E Weste, David Harris andAyanBanerjee,"CMOS VLSI Design – A Circuits and Systems Perspective", 3rd Ed, Pearson, 2009.
3. M. Michael Vai, "VLSI Design", 2001, CRC Press.

References:

1. Ming-BO Lin, "Introduction to VLSI Systems: A Logic, Circuit and System Perspective", CRC Press, 2011
2. John .P. Uyemura, "CMOS logic circuit Design", Springer, 2007.
3. Wayne Wolf, "Modern VLSI Design", Pearson Education, 3rd Edition, 1997.
4. K .Lal Kishore and V. S. V. Prabhakar, "VLSI Design", I.K International, 2009.
5. Mead & Convey, "Introduction to VLSI", BS Publications, 2010.

Course Outcomes:

At the end of this course, the students will be able to

- Understand different steps involved in the fabrication of ICs and electrical properties of MOS devices. (L2)
- Know the design rules in drawing the layout of any logic circuit.(L1)
- Describe different types of logic gates using CMOS inverter and their transfer characteristics.(L1)
- Learn the concepts to design building blocks of data path of any system using gates.(L1)
- Gain knowledge about basic programmable logic devices and testing of CMOS circuits.(L1)

B.Tech III Year II Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

20AEC64a- ELECTRONIC MEASUREMENTS AND INSTRUMENTATION

(Professional Elective-II)

L–T – P - C
3 – 0 – 0 – 3

Course Objectives:

- To know about the performance characteristics of instruments and measurement of electrical quantities.
- To understand the construction, working and applications of different types of CRO"s.
- To analyze the working of different types of bridges.
- To study the working of signal & function generators and logic & spectrum analyzers.
- To analyze the working of sensors and transducers in measuring physical parameters.

UNIT-I

Performance characteristics of Instruments: Static characteristics, Accuracy, Precision, Resolution, Sensitivity, static and dynamic calibration, Errors in Measurement, and their statistical analysis, dynamic characteristics-speed of Response, fidelity, Lag and dynamic error. DC ammeters, DC voltmeters-multirange, range extension/solid state and differential voltmeters, AC voltmeters--multirange, range extension. Thermocouple type RF ammeter, ohm meters, series type, shunt type, multimeter for voltage, current and resistance measurements.

Learning Outcomes:

At the end of the unit, the student will be able to:

- Learn about the performance characteristics of the instruments.(L1)
- Understand the working of different types of ammeters, voltmeters and multimeters. (L2)

UNIT-II

Oscilloscopes: Introduction, Basic Principle, Standard specifications of CRO,CRT features, vertical and horizontal amplifiers, horizontal and vertical deflection systems, sweep trigger pulse, delay line, sync selector circuits, probes for CRO – active, passive, and attenuator type, triggered sweep CRO, and Delayed sweep, dual trace/beam CRO, Measurement of amplitude, frequency and phase (Lissajous method). Principles of sampling oscilloscope, storage oscilloscope, and digital storage oscilloscope, Digital frequency counters, time & Period measurements.

Learning Outcomes:

At the end of the unit, the student will be able to:

- Grasp the construction and working of different types of oscilloscopes.(L1)
- Use CRO to measure the amplitude, frequency, phase and time period of given signals.(L3)

UNIT-III

Bridges: DC Bridges for Measurement of resistance: Wheat stone bridge, Kelvin's Bridge, AC Bridges for Measurement of inductance- Maxwell's bridge, Hay's Bridge, Anderson bridge. Measurement of capacitance- Schearing Bridge, Wien Bridge. Errors and precautions in using bridges.

Learning Outcomes:

At the end of the unit, the student will be able to:

- Understand the construction and working of different types of bridges.(L2)
- Measure parameters like resistance, capacitance, and inductance using bridges.(L3)

UNIT-IV

Signal Generators : Signal generator-fixed and variable, AF oscillators, function generators, pulse, random noise, sweep, and arbitrary waveform generators, their standards, specifications and principles of working (Block diagram approach).Wave analyzers, Harmonic distortion analyzers, Spectrum analyzers, and Logic analyzers.

Learning Outcomes:

At the end of the unit, the student will be able to:

- Understand the working and applications of signalgenerators and function generators.(L2)
- Learn the working and applications of different types of wave analyzers.(L1)

UNIT-V

Sensors and Transducers - Active and passive transducers: Measurement of displacement (Resistance, capacitance, inductance; LVDT) Force (strain gauges) Pressure (piezoelectric transducers) Temperature (resistance thermometers, thermocouples and thermistors), Velocity, Acceleration, Vibration, pH measurement Signal Conditioning Circuits.

Learning Outcomes:

At the end of the unit, the student will be able to:

- Understand the basic working principle and applications of different sensors and transducers.(L2)
- Measure physical parametersusing different types of sensors and transducers.(L1)

TEXT BOOKS:

1. A.D. Helfrick and W.D. Cooper, "Modern Electronic Instrumentation and Measurement Techniques", 5th Edition, PHI, 2002.
2. H.S.Kalsi, "Electronic Instrumentation", 2nd edition, Tata McGraw Hill, 2004.

REFERENCES:

1. David A. Bell, "Electronic Instrumentation & Measurements", 2nd Edition, PHI, 2003.
2. K. Lal Kishore, "Electronic Measurements & Instrumentations", Pearson Education, 2009.

Course Outcomes:

At the end of this course, the students will be able to

- Learn about the performance characteristics of instruments and measurement of electrical quantities. (L1)
- Understand the construction, working and applications of different types of CRO"s.(L2)
- Compare the working of different types of bridges. (L2)
- Know the working of signal & function generators and logic & spectrum analyzers. (L2)
- Grasp the working of sensors and transducers in measuring physical parameters.(L2)

B.Tech III Year II Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

20AEC64b- RF CIRCUIT DESIGN

(Professional Elective-II)

L–T – P - C
3 – 0 – 0 – 3

Course Objectives:

- To analyze RF components, circuits and networks.
- To understand the concept of Impedance matching and biasing networks.
- To analyze different types of RF Active components and Filters.
- To design and analyze the characteristics of RF Amplifiers.
- To analyze the characteristics of oscillators and mixers.

UNIT I

RF Electronic Components, Circuits& Networks : The Electromagnetic frequency bands and their applications, units and Physical Constants, Microwave bands, RF behavior of Passive components: Tuned resonant circuits, Varactors, Inductors and Capacitors, Voltage and Current in capacitor circuits. Microstrip Transmission Lines- types, Special Termination Conditions- sourced and Loaded Transmission Lines. The Smith Chart, Inter connectivity networks, Network properties and Applications, Scattering Parameters.

Learning Outcomes:

At the end of the unit, the student will be able to:

- Analyze RF components and circuits.(L4)
- Understand special termination conditions in transmission lines and network properties.(L2)

UNIT II

Matching Network and Biasing

Impedance matching using discrete components- Two component, T and π matching networks, Microstrip line matching networks- Single stub and Double stub matching networks, Amplifier classes of Operation and biasing networks- BJT and FET biasing networks.

Learning Outcomes:

At the end of the unit, the student will be able to:

- Understand the concept of Impedance matching. (L2)
- Learn the operation of biasing networks. (L1)

UNIT III

Active RF Components

Filter basics–Lumped filter design– Distributed Filter Design–Diplexer Filters-Crystal and Saw filters-Active Filters - Tunable filters. RF Diodes– BJTs- FETs and Models.

Learning Outcomes:

At the end of the unit, the student will be able to:

- Analyze different types of RF Active components. (L4)
- Learn the design and analysis of different types of RF Filters.(L1)

UNIT IV

RF Amplifier Design

Characteristics of Amplifiers- Amplifier power relations and Circuit Configurations, Stability Considerations, Small Signal amplifier design, Power amplifier design, Broadband, High Power, multistage amplifiers, Low noise amplifiers, VGA Amplifiers.

Learning Outcomes:

At the end of the unit, the student will be able to:

- Learn the power relations and stability considerations.(L1)
- Design and analyze the characteristics of different types RF Amplifiers.(L6)

UNIT V

Oscillators and Mixers

Oscillator basics, Low phase noise oscillator design, High frequency Oscillator configuration, LC Oscillators, VCOs, Gunn Element Oscillator, PLL Synthesizer. Basic characteristics of mixer-Active mixers, Image Reject and Harmonic mixers, Frequency domain considerations.

Learning Outcomes:

At the end of the unit, the student will be able to:

- Understand the basics and design of oscillators.(L2)
- To analyze the characteristics of mixers.(L4)

TEXT BOOKS:

1. Reinhold Ludwing and PavelBretchko, "RF Circuit design: Theory and applications", Pearson Education Asia Publication, New Delhi 2001.
2. DevendraK.Misra, "Radio Frequency and Microwave Communication Circuits– Analysis and Design", Wiley Student Edition, John Wiley &Sons.

REFERENCE BOOKS:

1. Mathew M. Radmangh, "Radio frequency and Microwave Electronics", PE Asia Publ,2001.
2. Christopher Bowick, Cheryl AljuniandJohn Biyler, "RF Circuit Design–ElsevierScience", 2008.

Course Outcomes:

At the end of this course, the students will be able to

- Analyze different types of RF components, circuits and networks.(L4)
- Learn the concept of Impedance matching and biasing networks. (L1)
- Analyze different types of RF Active components and Filters.(L4)
- Design and analyze the characteristics of RF Amplifiers.(L6)
- Analyze the characteristics of oscillators and mixers.(L4)

B.Tech III Year II Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

20AEC64c- OPTICAL COMMUNICATIONS

(Professional Elective-II)

L–T – P - C
3 – 0 – 0 – 3

Course Objectives:

- To comprehend the basic concepts and functional blocks in optical communications.
- To read and analyze different types of signal distortions and losses in optical communication.
- To gain knowledge on optical sources and coupling.
- To introduce concepts related to photo detectors and fiber optical receivers.
- To learn about the optical systems design and applications.

UNIT-I

Introduction to Optical Fibers: Evolution of fiber optic system- Element of an Optical Fiber Transmission link- Ray Optics-Optical Fiber Modes and Configurations –Mode theory of Circular Wave guides- Overview of Modes-Key Modal concepts- Linearly Polarized Modes –Single Mode Fibers-Graded Index fiber structure.

Learning Outcomes:

At the end of the unit, the student will be able to:

- Understand the basic concepts of optical communication.(L2)
- Analyze different optical Fiber modes and configurations.(L4)

UNIT-II

Signal Dégradation Optical Fibers: Attenuation – Absorption losses, Scattering losses, Bending Losses, Core and Cladding losses, Signal Distortion in Optical Wave guides - Information Capacity determination –Group Delay- Material Dispersion, Wave guide Dispersion, Signal distortion in SM fibers-Polarization Mode dispersion, Intermodal dispersion, Pulse Broadening in GI fibers-Mode Coupling –Design Optimization of SM fibers-RI profile and cut-off wavelength.

Learning Outcomes:

At the end of the unit, the student will be able to:

- Analyze the losses due to scattering, bending, core and cladding. (L4)
- Understand different type's dispersion mechanisms.(L2)

UNIT-III

Fiber Optical Sources and Coupling : Direct and indirect Band gap materials-LED structures – Light source materials –Quantum efficiency and LED power, Modulation of a LED, lasers Diodes-Modes and Threshold condition –Rate equations –External Quantum efficiency –Resonant frequencies –Temperature effects, Introduction to Quantum laser, source-to-fiber Power Launching, Lensing schemes, Fibre –to- Fibre joints, Fibre splicing.

Learning Outcomes:

At the end of the unit, the student will be able to:

- Understand different types of light source materials and their structures.(L2)
- Know about the importance of different types connectors.(L1)

UNIT-IV

Fiber Optical Receivers : PIN and APD diodes –Photo detector noise, SNR, Detector Response time, Avalanche Multiplication Noise –Comparison of Photo detectors –Fundamental Receiver Operation – preamplifiers, Error Sources –Receiver Configuration –Probability of Error – Quantum Limit.

Learning Outcomes:

At the end of the unit, the student will be able to:

- Understand the operation of Photo Detectors.(L2)
- Know about fiber optical receiver operation and various sources of error.(L1)

UNIT-V

System Design and Applications: Design of Analog Systems: system specification, power budget, bandwidth budget

Design of Digital Systems: system specification, rise time budget, power budget, Receiver sensitivity, Overview of WDM.

Applications: Telephony, Telemetry, video distribution, military applications, passive and active sensing.

Learning Outcomes:

At the end of the unit, the student will be able to:

- Understand the design and specifications of analog and digital systems.(L2)
- Summarize the applications of optical communications.(L1)

TEXT BOOKS:

1. Gerd Keiser, "Optical Fiber Communication", 3rd Edition, McGraw –Hill International, Singapore, 2000.
2. J.Senior, "Optical Fiber Communication, Principles and Practice", 3rd Edition, Pearson Publishers, 2010.

REFERENCES:

1. Max Ming-Kang Liu, "Principles and Applications of Optical Communications", 1st Edition, TMH, 2010.
2. S.C.Gupta, "Text book on optical fiber communication and its applications", 2nd Edition, PHI, 2012.

Course Outcomes:

At the end of this course, the students will be able to

- Understand the basic concepts and about the functional blocks in optical communication.(L2)
- Analyze different types of signal distortions and losses in optical communication.(L4)
- Gain the knowledge on optical sources and coupling.(L1)
- Understand the concepts related to photo detectors and fiber optical receivers. (L2)
- Know about the optical systems design and applications.(L1)

B.Tech III Year II Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

20AEC66- DIGITAL SIGNAL PROCESSING LAB

L–T – P - C
0 – 0- 3- 1.5

Course Objectives:

- To simulate basic signal processing operations like convolution and correlation.
- To simulate DSP operations like DFT and FFT.
- To design and implement IIR and FIR filters using simulation software and verify their frequency responses.

List of Experiments:

1. Generating, plotting and finding the power and energy a given signal.
2. Convolution and correlation (auto and cross) of discrete sequences without using built in functions.
3. DTFT of a given signal
4. N-Point Decimation in timeFFT algorithm.
5. N-Point Decimation in frequency FFT algorithm.
6. Find the frequency response of analog Butterworth prototype filters (LP/HP/BP/BR).
7. Find the frequency response of analog chebyshev prototype filters (LP/HP/BP/BR).
8. Implement IIR Butterworth filter (LP/HP/BP/BR) using bilinear transformation techniques.
9. Implement IIR Chebyshev filter (LP/HP/BP/BR) using impulse-invariance transformation techniques.
10. Design of FIR filter using window technique and verifying the frequency response of the filter
11. Design of IIR filter using any of the available methods and verifying the frequency response of the filter
12. Design of FIR filters using frequency sampling method.

- Note : Implement any one program on the DSP board.

Course Outcomes:

At the end of this course, the students will be able to

- Simulate and analyze basic signal processing operations like convolution and correlation.(L4)
- Simulate and analyze DSP operations like DFT and FFT.(L4)
- Design and implement IIR and FIR filters and verify their frequency responses.(L6)

B.Tech III Year II Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

20AEC67- MICROWAVE ENGINEERING LAB

L–T – P - C
3 - 0 - 0 -1.5

Course Objectives:

- To understand the working, different microwave components and sources in a microwave bench.
- To verify the characteristics of various microwave components using microwave bench set up.
- To draw the radiation pattern of microwave antennas.

Minimum Ten Experiments to be conducted

1. Reflex Klystron Characteristics.
2. Gunn Diode Characteristics.
3. Attenuation Measurement.
4. Directional Coupler Characteristics.
5. VSWR Measurement.
6. Impedance and Frequency Measurement.
7. Waveguide parameters measurement.
8. Scattering parameters of Directional Coupler.
9. Scattering parameters of Magic Tee.
10. Scattering parameters of Circulator.
11. Radiation Pattern Measurement of Horn Antenna.
12. Radiation Pattern Measurement of Patch Antenna.

Course Outcomes:

At the end of this course, the students will be able to

- Understand the working, different microwave components and sources in a microwave bench.(L2)
- Verify the characteristics of various microwave components using microwave bench set up.(L3)
- Draw the radiation pattern of microwave antennas.(L3)

B.Tech III Year II Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

20AEC68- VLSI DESIGN LAB

L–T – P - C
3 - 0 - 0 -1.5

Course Objectives:

- Understand the layout design rules.
- Learn implementation of Layout, Physical Verification and place & route for complex designs.
- Verify the Layouts of DRC and LVS.

The students are required to do at least TEN experiments, design the logic circuit and test bench to perform the following experiments using necessary simulator (Mentor Graphics) to verify the logical/functional operation and to perform the analysis with appropriate synthesizer (Mentor Graphics) and then validate the implemented logic with different hardware modules/kits (FPGA kits).

List of Experiments:

1. Realization of Logic Gates.
2. 3 to 8 Decoder.
3. Priority Encoder.
4. 8X1 Multiplexer and 2X4 De-multiplexer.
5. 4 Bit Comparator.
6. D Flip-Flop.
7. Decade Counter.
8. Random Counter.
9. Universal Shift Register.
10. Single Port Synchronous RAM.
11. Synchronous FIFO.
12. Dual Port Asynchronous RAM.

Course Outcomes:
At the end of this course, the students will be able to

- Gain knowledge on the layout design rules.(L1)
- Implement Layout, Physical Verification and place & route for complex designs.(L6)
- Verify the Layouts of DRC and LVS.(L5)

B.Tech III Year II Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

20AEC60- PCB DESIGN AND PROTOTYPE DEVELOPMENT

(SKILL ORIENTED COURSE – IV)

L–T – P - C
1 – 0 – 2 – 2

Fundamental of basic electronics : Component identification, Component symbols & their footprints, Understand schematic, Creating new PCB, Browsing footprints libraries, Setting up the PCB layers, Design rule checking, Track width selection, Component selection, Routing and completion of the design

Introduction to PCB: Definition and Need/Relevance of PCB, Background and History of PCB, Types of PCB, Classes of PCB Design, Terminology in PCB Design, Different Electronic design automation (EDA)tools and comparison.

PCB Design Process: PCB Design Flow, Placement and routing, Steps involved in layout design, Artwork generation Methods - manual and CAD, General design factors for digital and analogue circuits, Layout and Artwork making for Single-side, double-side and Multilayer Boards, Design for manufacturability, Design-specification standards

Practice Exercises: Any twelve experiments are to be done

1. Practice following PCB Design steps
   - Schematic Design: Familiarization of the Schematic Editor, Schematic creation, Annotation, Net list generation.
   - Layout Design: Familiarization of Foot print Editor ,Mapping of components, Creation of PCB layout Schematic.
   - Create new schematic components.
   - Create new component footprints.
2. Regulator circuit using 7805
3. Inverting Amplifier or Summing Amplifier using op-amp
4. Full-wave Rectifier
5. A stable multivibrator using IC555
6. Monostable multivibrator using IC555
7. RC Phase-shift or We in-bridge Oscillator using transistor.
8. Full-Adder using half-adders.
9. 4-bit binary /MOD N counter using D-Flip flops.
10. One open-ended (analog/ digital/mixed circuit) experiments of similar nature and magnitude to the above are to be assigned by the teacher
    (Student is expected to solve and execute/simulate independently).
11. Design an 8051 Development board having **Power section** consisting of IC7805, capacitor, resistor, headers, LED.
12. Design an 8051 Development board having **Serial communication section** consisting of MAX 232, Capacitors, DB9connector, Jumper, LEDs
13. Design an 8051 Development board having **Reset & Input/output sections** consisting of 89C51 Microcontroller, Electrolytic Capacitor, Resistor, Jumper, Crystal Oscillator, Capacitors
14. Fabricate a single-sided PCB, mount the components and assemble them in a cabinet for any one of the circuits mentioned in the above exercises.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR
College of Engineering (Autonomous), Pulivendula - 516390, A.P, INDIA.

L	T	P	C
3	0	0	0

Constitution of India

Course Objectives:

1. To enable the student to understand the importance of constitution.
2. To understand philosophy of fundamental rights and duties.
3. To understand the structure of executive, legislature and judiciary.
4. To understand the autonomous nature of constitutional bodies like Supreme Court and high court controller and auditor general of India and election commission of India.
5. To understand the central and state relation financial and administrative.

UNIT-I

Introduction to Indian Constitution: Constitution' meaning of the term, Indian Constitution - Sources and constitutional history, Features - Citizenship, Preamble, Fundamental Rights and Duties, Directive Principles of State Policy.

Learning Outcomes:

At the end of this unit students will be able to:

1. Understand the concept of Indian constitution.
2. Apply the knowledge on directive principle of state policy.
3. Analyze the History, features of Indian constitution.
4. Evaluate Preamble Fundamental Rights and Duties.

UNIT-II

Democratic forms of Constitution, Union Government and its Administration Structure of the Indian Union: Centre- State relationship, President: Role, power and position, PM and Council of ministers, Cabinet and Central Secretariat, Lok Sabha, Rajya Sabha, The Supreme Court and High Court: Powers and Functions;

Learning Outcomes:

At the end of this unit students will be able to:

1. Understand the structure of Indian government.
2. Differentiate between the state and central government.
3. Explain the role of President and Prime Minister.
4. Know the Structure of supreme court and High court.

UNIT-III

Federalism, Political relations, Financial relations of State Government and its Administration Governor - Role and Position - CM and Council of ministers, State Secretariat: Organisation, Structure and Functions.

Learning Outcomes:

At the end of this unit students will be able to:

1. Understand the structure of state government.
2. Analyze the role Governor and Chief Minister.
3. Explain the role of state Secretariat.
4. Differentiate between structure and functions of state secrateriate.

UNIT-IV

A. Local Administration - District's Administration Head - Role and Importance, Municipalities - Mayor and role of Elected Representative - CEO of Municipal Corporation PachayatiRaj: Functions PRI: Zila Panchayat, Elected officials and their roles, CEO Zila Panchayat: Block level Organizational Hierarchy - (Different departments), Village level - Role of Elected and Appointed officials - Importance of grass root democracy.

Learning Outcomes:

At the end of this unit students will be able to:

1. Understand the local Administration.
2. Compare and contrast district administration role and importance.
3. Analyze the role of Myer and elected representatives of Municipalities.
4. Evaluate Zilla panchayat block level Organisation.

UNIT-V

Election Commission: Election Commission- Role of Chief Election Commissioner and Election Commissionerate , State Election Commission, Supreme Court, High Court.

Learning Outcomes:

At the end of this unit students will be able to:

1. Know the role of Election Commission apply knowledge.
2. Contrast and compare the role of Chief Election commissioner and Commissiononerate.
3. Analyze role of state election commission.
4. Evaluate various commissions of viz SC/ST/OBC and women.

REFERENCES:

1. Durga Das Basu, Introduction to the Constitution of India, Prentice – Hall of India Pvt. Ltd.. New Delhi.
2. Subash Kashyap, Indian Constitution, National Book Trust.
3. J.A. Siwach, Dynamics of Indian Government & Politics.
4. D.C. Gupta, Indian Government and Politics.
5. H.M.Sreevai, Constitutional Law of India, 4th edition in 3 volumes (Universal Law Publication.
6. J.C. Johari, Indian Government and Politics Hans.

Course Outcomes:

1. Understand historical background of the constitution making and its importance for building a democratic India.
2. Understand the functioning of three wings of the government ie., executive, legislative and judiciary.
3. Understand the value of the fundamental rights and duties for becoming good citizen of India.
4. Analyze the decentralization of power between central, state and local self-government.
5. Apply the knowledge in strengthening of the constitutional institutions like CAG, Election Commission and UPSC for sustaining democracy.

6. Know the sources, features and principles of Indian Constitution.
7. Learn about Union Government, State government and its administration.
8. Get acquainted with Local administration and Pachayati Raj.
9. Be aware of basic concepts and developments of Human Rights.
10. Gain knowledge on roles and functioning of Election Commission.

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA				
B.Tech. VI /VII-Sem (R20)				
NUMERICAL TECHNIQUES **(Open Elective -II)**				
	L	**T**	**P**	**C**
	3	**0**	**0**	**3**

Course Objectives: This course aims at providing the student

- With the concepts and several methods of Numerical methods.
- To explore the solutions of ordinary differential equations, partial differential equations and integral equations.

UNIT – 1: Solution to System of Nonlinear Equations and Spline Functions:	**9 Hrs**

Method of Iteration- Newton-Raphson method. Linear splines - Quadratic splines – Cubic splines: Minimizing property of Cubic splines – Error in the Cubic Spline ad its derivatives – Surface fitting by cubic splines. – Cubic B-Splines: Representation of B- Splines – Least squares solution – Applications of B-Splines.

Learning Outcomes:

At the end of this unit, the student will be able to

• Solve the algebraic and transcendental equations.	L2
• Solve the system of nonlinear equations and spline functions.	L4

UNIT – II: Numerical Linear Algebra:

Triangular matrices – LU decomposition of a matrix – vector and matrix norms. – Solutions of linear systems –Direct methods: Gauss elimination – necessary for pivoting – Gauss-Jordan method – modification of the Gauss method to compute the inverse – number of arithmetic operations – LU decomposition method – computational procedure for LU decomposition method – LU decomposition from Gauss elimination – solution of tridiagonal systems – III conditioned linear systems – Method for III- conditioned systems. – Solution of linear systems –Iterative methods.

Learning Outcomes:

At the end of this unit, the student will be able to

• Understand the concepts of numerical linear algebra.	**L1**
• Apply the concepts of numerical linear algebra.	**L3**

UNIT – III: Initial and Boundary value problems:

Predictor-Corrector methods: Adams-Moulton method – Milne's method. – Cubic Spline method – Simultaneous and higher order equations. – Boundary value problems: Finite difference method – Cubic Spline method – Galerkin's method.

Learning Outcomes:

At the end of this unit, the student will be able to

• Solve first order initial value problems.	L3
• Solve ssimultaneous and higher order equations and boundary value problems.	L4

UNIT – IV: Numerical solution of Laplace's equation and Poisson's equation:

Laplace's equation and Poisson's equation – Finite difference approximations to derivatives – solution of Laplace's equation and Poisson's equation: Jacobi's method – Gauss-Seidel method – Successive over

Mesuy

relaxation method – ADI method.	
Learning Outcomes:	
At the end of this unit, the student will be able to	
• Solve Laplace's equation using finite difference technique.	L3
• Solve Poisson's equation through iterative methods.	L4
UNIT – V: One dimensional Heat equation & Wave equation:	
Heat equation in one dimension: Finite difference approximations-Bender-Schmidt recurrence formula-Crank-Nicolson formula ; Iterative methods for the solution of equations - Gauss-Seidel iteration formula and One dimensional Wave equation.	
Learning Outcomes:	
At the end of this unit, the student will be able to	
• Apply numerical methods for solving one dimensional heat equation.	L3
• Apply numerical methods for solving one dimensional wave equation.	L4
Text Books:	
1. S. S. Sastry, Introductory Methods of Numerical Analysis(Fifth Edition 2012), PHI Learning Private Limited, New Delhi.	
Reference Books:	
1. M.K.Jain,S.R.K.Iyengar, R.K.Jain, Numerical Methods for Scientific and Engineering Computation (sixth edition),Nee Age International(P) Limited, Publishers, New Delhi.	
2. K.E. Atkinson, An Introduction to Numerical Analysis, Wiley, 1989.S.D. Conte and C. De Boor, Elementary Numerical Analysis 302226 An Algorithmic Approach, McGraw-Hill, 1981.	
3. K. Eriksson, D. Estep, P. Hansbo and C. Johnson, Computational Differential Equations, Cambridge Univ. Press, Cambridge, 1996.	
4. G.H. Golub and J.M. Ortega, Scientific Computing and Differential Equations: An Introduction to Numerical Methods, Academic Press, 1992.	
5. J. Stoer and R. Bulirsch, Introduction to Numerical Analysis, 2nd ed., Texts in Applied Mathematics, Vol. 12, Springer Verlag, New York, 1993.	
Course Outcomes:	
At the end of this Course the student will be able to	
• Understand the need of numerical methods in solving engineering problems of various fields.	**L1**
• Learn various numerical techniques to solve initial and boundary value problems.	**L2**
• Apply various methods in solving Laplace's equation.	**L3**
• Emphasizes the numerical solutions of one dimensional heat and wave equations .	**L4**
• Analyze the problems in engineering and technology using various techniques of Numerical methods.	**L5**

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JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS)::PULIVENDULA
DEPARTMENT OF PHYSICS
III B.TECH – II SEMESTER-R20 (Open elective-Interdisciplinary) –OE-ID.1(THEORY

MATERIALS CHARACTERIZATION TECHNIQUES
(Common to all branches)

L	T	P	C
3	0	0	3

Course Objectives:

- The latest analysis techniques and material structure and property correlation
- The most advanced imaging instruments for investigating the modern materials at the highest topographic resolution
- The commonly used analytical tools for characterizing modern materials at highest sensitivity
- The latest advancement in spectroscopy for getting structural and elemental analysis of Materials

UNIT – 1: Structure analysis by Powder X-Ray Diffraction — **9 Hrs**

Introduction, Bragg's law of diffraction, Intensity of Diffracted beams –factors affecting Diffraction Intensities - structure of polycrystalline Aggregates, Determination of crystal structure, Crystallite size by Scherrer equation, Small angle X-ray scattering (SAXS) (in brief).

Learning Outcomes:

At the end of this unit, the student will be able to

• **Understand** the diffraction phenomenon in crystals	L1
• **Identify** the factors affecting diffraction pattern intensities	L2
• **Explain** the polycrystalline nature of the material	L3
• **Analyze** the crystal structure and crystallite size by various methods	L4
• **Illustrate** the Small angle X-ray scattering (SAXS)	L2

UNIT – II: Microscopy technique -1 –Scanning Electron Microscopy (SEM) — **9 Hrs**

Introduction, Principle, Construction and working principle of Scanning Electron Microscope, Specimen preparation, Different types of modes used (Secondary Electron and Back scattered Electron), Energy Dispersive X-ray Analyzer (to provide elemental identification and quantitative compositional information), Advantages and limitations of SEM.

Learning Outcomes:

At the end of this unit, the student will be able to

• **Explain** the basic concepts and working principle of Scanning Electron Microscope	L1
• **Classify** the different types of Scanning Electron Microscope modes used	L2
• **Identifies** the specimen preparation for Scanning Electron Microscope	L2
• **Analyze** the morphology of the sample by using Scanning Electron Microscope	L4
• **Understand** the advantages and limitations of Scanning Electron Microscope	L2

UNIT – III: Microscopy Technique -2 - Transmission Electron Microscopy (TEM) — **9Hrs**

Principle, Construction and Working principle, Resolving power and Magnification, Bright and dark fields, Diffraction and image formation, Specimen preparation, Selected Area Diffraction, Applications of Transmission Electron Microscopy,Difference between SEM and TEM, Advantages and Limitations of Transmission Electron Microscopy.

Learning Outcomes:	
At the end of this unit, the student will be able to	
• **Explain** the basic principle and working principle of Transmission Electron Microscope	L1
• **Classify** the different types of Transmission Electron Microscope modes used	L2
• **Identifies** the specimen preparation for Transmission Electron Microscope	L2
• **Analyze** the morphology and crystal structure of the sample by using Transmission Electron Microscope	L2
• **Understand** the advantages and limitations of Transmission Electron Microscope	L3

UNIT – IV: Spectroscopy techniques **9 Hrs**

Principle, Experimental arrangement, Analysis and Advantages of the spectroscopic techniques – (i) UV-Visible spectroscopy – quantitative analysis of elements and organic compounds, energy band gap determination – wood and Tauc and KubelkaMunk functions (ii) Raman Spectroscopy – Molecular analysis using vibrational modes (iv) X-ray photoelectron spectroscopy (XPS) for surface materials characterization and chemical analysis.

Learning Outcomes:	
At the end of this unit, the student will be able to	
• **Explain** the principle and experimental arrangement of spectrometers	L1
• **Understand** the analysis and advantages of the spectroscopic techniques	L2
• **Explain** the concept of UV-Visible spectroscopy	L2
• **Explain** the principle and experimental arrangement of Raman Spectroscopy	L2
• **Explain** the principle and experimental arrangement of X-ray photoelectron spectroscopy (XPS)	L2

UNIT – V: Electrical & Magnetic Characterization techniques

Electrical Properties analysis techniques (DC conductivity, AC conductivity) Activation Energy, Effect of Magnetic field on the electrical properties (Hall Effect). Magnetization measurement by induction method,Vibrating sample Magnetometer (VSM) and SQUID (Superconducting Quantum Interference Device)

Learning Outcomes:	
At the end of this unit, the student will be able to	
• **Explain** the various types of electrical properties analysis techniques	L1
• **Explain** the effect of magnetic field on the electrical properties	L2
• **Analyze** the magnetization by using induction method	L2
• **Explain** the construction and working principle of VSM	L2
• **Explain** the construction and working principle of SQUID	L2

Text Books:

1. Material Characterization: Introduction to Microscopic and Spectroscopic Methods – Yang Leng – John Wiley & Sons (Asia) Pvt. Ltd. 2008
2. Microstructural Characterization of Materials - David Brandon, Wayne D Kalpan, John Wiley & Sons Ltd., 2008.

Reference Books:

1. Fundamentals of Molecular Spectroscopy – IV Ed. – Colin Neville BanwellandElaine M. McCash, Tata McGraw-Hill, 2008.
2. Elements of X-ray diffraction – Bernard Dennis Cullity & Stuart R Stocks, Prentice Hall , 2001 – Science.

Course Outcomes:	
At the end of this Course the student will be able to	
• **Identify** the various characterization techniques	**L1**
• **Classify** the characterization techniques based on their applications and properties	**L2**
• Ilustates the various characterization techniques for materials characterization.	**L3**
• **Apply** suitability in Engineering Applications	**L4**

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA				
B.Tech – IV-I-Sem	L	T	P	C
	3	0	0	3

Polymers and their applications (OE.2)
(common to all branches)

Course Objectives:

- To understand the basic principles of polymers
- To synthesize the different polymeric materials and their characterization by various instrumental methods.
- To impart knowledge to the students about fundamental concepts of Hydro gels of polymer networks, surface phenomenon by micelles
- To enumerate the applications of polymers in engineering

UNIT-I: **Polymers-Basics and Characterization**	9 Hrs

Basic concepts: monomers, repeat units, degree of polymerization, linear, branched and network polymers, classification of polymers, Polymerization mechanisms: condensation, addition.Molecularweight concepts: determination bynumber, weight and viscosity average molecular weights, polydispersity and molecular weight distribution. Measurement of molecular weight: end group, viscosity, light scattering, osmotic and ultracentrifugation methods, analysis and testing of polymers, Characterization of polymers by XRD, DSC.

Learning Outcomes:
At the end of this unit, the student will be able to:

- Classify the polymers (L3)
- Explain polymerization mechanism (L2)
- Differentiate addition, condensation polymerizations(L2)
- Describe measurement of molecular weight of polymer(L2)

UNIT-II: **Synthetic Polymers**	8 Hrs

Polymerization processes – Bulk, Solution, Suspension and Emulsion polymerization.Preparation and significance, classification of polymers based on physical properties, Thermoplastics, Thermosetting plastics, Fibers and elastomers, General Applications. Preparation of Polymers based on different types of monomers, Olefin polymers, Diene polymers, nylons, Urea - formaldehyde, phenol - formaldehyde and melamine Epoxy and Ion exchange resins.

Learning Outcomes:
At the end of this unit, the student will be able to:

- Differentiate Bulk, solution, Suspension and emulsion polymerization(L2)
- Describe fibers and elastomers (L2)
- Identify the thermosetting and thermo polymers(L3)

UNIT-III: Natural Polymers & Modified cellulosics	8 Hrs

Natural Polymers: Chemical & Physical structure, properties, source, important chemical modifications, applications of polymers such as cellulose, lignin, starch, rosin, shellac, latexes, vegetable oils and gums, proteins.Modified cellulosics: Cellulose esters and ethers such as Ethyl cellulose, CMC, HPMC, cellulose acetals, Liquid crystalline polymers; specialty plastics- PES, PAES, PEEK, PEA.

Learning Outcomes:

After completing the course, the student will be able to:

- Describe the properties and applications of polymers(L2)
- Interpret the properties of cellulose, lignin, starch, rosin, latex (L2)
- Discuss the special plastics of PES, PAES, PEEK (L3)
- Explain modified cellulosics(L2)

UNIT-IV: Hydrogels of Polymer networks and Drug delivery	8 Hrs

Definitions of Hydrogel, polymer networks, Types of polymer networks, Methods involved in hydrogel preparation, Classification, Properties of hydrogels, **Applications** of hydrogels in drug delivery.Introduction to drug systems including regulation, absorption and disposition, routes of administration and dosage forms. Advanced drug delivery systems and controlled release.

Learning Outcomes:

After completing the course, the student will be able to:

- Identify types of polymer networks(L3)
- Describe methods involve in hydrogel preparation(L2)
- Explain applications of hydrogels in drug delivery(L2)
- Demonstrate the advanced drug delivery systems and controlled release(L2)

UNIT-V: **Advanced Polymers for engineering applications**	7Hrs

Importance of advance polymers examples-polymers in sensors,conducting and synthetic metals, photonics, thermoplastics. Applications of Biodegradable polymers, Bio-PET, BIO-PEP, Polylactides

Learning Outcomes:

After completing the course, the student will be able to:

- Demonstrate conducting polymers (L3)
- Explain Biodegradable polymers (L2)
- Discuss applications of Biodegradable polymers, Bio-PET, BIO-PEP, Polylactides (L3)

Text Books:

1. Fred W.Billmayer, A Text book of Polymer science, 3rd Edition, Wiley India, 2007
2. K.J.Saunders, Organic polymer Chemistry, Chapman and Hall, 1973.

Reference Books:

1. B.Miller, Advanced Organic Chemistry, Prentice Hall, 2nd Edn, 2003
2. Ambikanandan Misra, Aliasgar Shahiwala, Applications of polymers in Drug delivery system, Elsevier Pub., 2020.
3. Gowarikar, Polymer Chemistry –New Age International Publications, 2019
4. Physical Chemistry , Samel Galsstone, Lan Caster Press, 1970.

Course Outcomes:

At the end of this Course the student will be able to

- Understand the state of art synthesis of Polymeric materials(L1)
- Understand the hydro gels preparation, properties and applications in drug delivery system (L2).
- Explain biodegradable polymers(L2)
- Discuss applications of Biodegradable polymers (L3)

B.Tech III Year II Sem & IV Year I Sem

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS)::PULIVENDULA

20ACE65A- ENVIRONMENTAL IMPACT ASSESSMENT

(Open Elective-II)

L	T	P	C
3	0	0	3

Course Objectives:

- This course is aimed at exposing the student to the concept of environmental impact assessment and methodologies used for the same.
- The student will also be imparted the knowledge about the various laws related to EIA and also methods of EIA audit.

UNIT-I:

INTRODUCTION:-

Basic concept of EIA : Initial environmental Examination, Elements of EIA, - factors affecting E-I-A Impact evaluation and analysis, preparation of Environmental Base map, Classification of environmental parameters.

UNIT-II:

EIA METHODOLOGIES:-

E I A Methodologies: introduction, Criteria for the selection of EIA Methodology, E I A methods, Ad-hoc methods, matrix methods, Network method Environmental Media Quality Index method, overlay methods and cost/benefit Analysis.

UNIT-III

IMPACT OF DEVELOPMENTAL ACTIVITIES AND LAND USE:-

Introduction and Methodology for the assessment of soil and ground water, Delineation of study area, Identification of actives. Procurement of relevant soil quality, Impact prediction, Assessment of Impact significance, Identification and Incorporation of mitigation measures. E I A in surface water, Air and Biological environment: Methodology for the assessment of Impacts on surface water environment, Air pollution sources, Generalized approach for assessment of Air pollution Impact.

UNIT-IV:

ASSEMENT OF IMPACT ON VEGETATION AND WILDLIFE :

Introduction - Assessment of Impact of development Activities on Vegetation and wildlife, environmental Impact of Deforestation – Causes and effects of deforestation.

ENVIRONEMNTAL AUDIT :

Introduction - Environmental Audit & Environmental legislation objectives of Environmental Audit, Types of environmental Audit, Audit protocel, stages of Environmental Audit, onsite activities, evaluation of Audit data and preparation of Audit report.

UNIT-V:

ENVIRONEMENTAL ACTS (PROTECTION AND PREVENTION)

Post Audit activities, The Environmental protection Act, The water preventation Act, The Air (Prevention & Control of pollution Act.), Wild life Act.Case studies and preparation of Environmental Impact assessment statement for various Industries.

Text Books:

- Environmental Impact Assessment Methodologies, byY. Anjaneyulu, B.S. Publication, Sultan Bazar,Hyderabad.
- Environmental Science and Engineering, by J. Glynn and Gary W. Hein Ke – Prentice HallPublishers

Reference Books:

1. Environmental Science and Engineering, by Suresh K. Dhaneja – S.K.,Katari& Sons Publication., NewDelhi.
2. Environmental Pollution and Control, by Dr H.S. Bhatia – Galgotia Publication (P) Ltd, Delhi

Course Outcomes:

At the end of this Course the student will be able to

1. Understand the concept of Environmental impact
2. Understand the methodologies related to EIA
3. Appreciate various laws related to environmental protection
4. Prepare the environmental impact assessment statement and to evaluateit.

B.Tech III Year II Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

ENERGY CONSERVATION & MANAGEMENT

(Open Elective-II)

L	T	P	C
3	0	0	3

Course Objectives: The objectives of the course are to make the students learn about

- To understand energy efficiency, scope, conservation and technologies.
- To design energy efficient lighting systems.
- To estimate/calculate power factor of systems and propose suitable compensation Techniques.
- To understand energy conservation in HVAC systems.
- To calculate life cycle costing analysis and return on investment on energy efficient Technologies.

UNIT – I: **09 Hrs**

Basic Principles of Energy Audit and management Energy audit – Definitions – Concept– Types of audit – Energy index – Cost index – Pie charts – Sankey diagrams – Load profiles – Energy conservation schemes and energy saving potential – Numerical problems – Principles of energy management – Initiating, planning, controlling, promoting, monitoring, reporting – Energy manager – Qualities and functions – Language – Questionnaire – Check list for top management.

Learning Outcomes:

At the end of this unit, the student will be able to

- To know about various types of Energy Audit **L1**
- To know about various types of Energy conservation schemes and Energy Manager functions **L2**

UNIT – II: **09 Hrs**

Lighting Modification of existing systems – Replacement of existing systems – Priorities: Definition of terms and units – Luminous efficiency – Polar curve – Calculation of illumination level – Illumination of inclined surface to beam – Luminance or brightness – Types of lamps – Types of lighting – Electric lighting fittings (luminaries) – Flood lighting – White light LED and conducting Polymers – Energy conservation measures

Learning Outcomes:

At the end of this unit, the student will be able to

- To know about various Lighting systems and types of lamps. **L1**
- To evaluate illumination level Illumination of inclined surface to beam and Design of Energy efficient lighting systems. **L2**

UNIT – III: **09 Hrs**

Power Factor and energy instruments Power factor – Methods of improvement – Location of capacitors – Power factor with non linear loads – Effect of harmonics on Power factor – Numerical problems. Energy Instruments – Watt–hour meter – Data loggers – Thermocouples – Pyrometers – Lux meters – Tong testers – Power analyzer.

Learning Outcomes:

At the end of this unit, the student will be able to

- To know about various Methods of Power Factor improvement **L1**
- To know about various Energy Instruments **L3**

UNIT – IV: **09 Hrs**

Space Heating and Ventilation Ventilation – Air–Conditioning (HVAC) and Water Heating: Introduction – Heating of buildings – Transfer of Heat–Space heating methods – Ventilation and air–conditioning – Insulation–Cooling load – Electric water heating systems – Energy conservation methods

Learning Outcomes:

At the end of this unit, the student will be able to

- To know about analysis of Heating and HVAC **L1**
- To know about Energy conservation methods **L2**

UNIT – V: **09 Hrs**

Economic Aspects and Analysis : Economics Analysis – Depreciation Methods – Time value of money – Rate of return – Present worth method – Replacement analysis – Life cycle costing analysis – Energy efficient motors (basic concepts).Computation of Economic Aspects Calculation of simple payback method – Net present worth method – Power factor correction – Lighting – Applications of life cycle costing analysis – Return on investment.

Learning Outcomes:

At the end of this unit, the student will be able to

- To know about basic concept of Analysis of Economics and different methods **L1**
- To know about Computation of Economic Aspects Calculation **L2**

Text Books:

1. Energy management by W.R. Murphy & G. Mckay Butter worth, Elsevier publications. 2012
2. Energy efficient electric motors by John.C.Andreas, Marcel Dekker Inc Ltd-2nd edition,1995.

Reference Books:

1. Electric Energy Utilization and Conservation by S C Tripathy, Tata McGraw hill publishing company Ltd. New Delhi.
2. Energy management by Paul o' Callaghan, Mc–Graw Hill Book company–1stedition, 1998.
3. Energy management hand book by W.C.Turner, John wiley and sons.
4. Energy management and conservation –k v Sharma and pvenkata seshaiah-I K International Publishing House pvt.ltd, 2011.
5. http://www.energymanagertraining.com/download/Gazette_of_IndiaP art IISecI-37_25-08-2010.pdf

Course Outcomes:

At the end of this Course the student will be able to

- Explain energy efficiency, conservation and various technologies. **L1**
- Design energy efficient lighting systems. **L2**
- Calculate power factor of systems and propose suitable compensation techniques. **L3**
- Explain energy conservation in HVAC systems. **L4**
- Determination of the economic analysis **L5**

B.Tech IV Year I Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

20AME65a-PROGRAMMING OF ROBOTS AND CONTROL

(Open Elective-II)

L	T	P	C
3	0	0	3

Course Objectives: The objectives of the course are to make the students learn about

- Learn the fundamental concepts of industrial robotic technology.
- Apply the basic mathematics to calculate kinematic and dynamic forces in robot manipulator.
- Understand the robot controlling and programming methods.
- Describe concept of robot vision system.

UNIT – I: Fundamentals of Robots: **10 Hrs**

Introduction, definition, classification and history of robotics, robot characteristics and precision of motion, advantages, disadvantages and applications of robots.

Learning Outcomes:

At the end of this unit, the student will be able to

- outline the advantages, disadvantages and applications of robot. L2
- compare the types of robot manipulators based on applications. L2

UNIT – II: Robot Actuators And Feedback Components: **8 Hrs**

Actuators, Pneumatic, Hydraulic actuators, Electric & Stepper motors, comparison. Position sensors - potentiometers, resolvers, encoders - velocity sensors, Tactile sensors, Proximity sensors.

Learning Outcomes:

At the end of this unit, the student will be able to

- Compare the types of actuators used in robot manipulator. L2
- List out the various types of robots and feedback components. L1

UNIT – III: Robot Programming: **8 Hrs**

Methods of programming - requirements and features of programming languages, software packages, problems with programming languages - VAL, RAIL, AML, C, C++.

Learning Outcomes:

At the end of this unit, the student will be able to

- List out the various methods of robot programming L1
- Explain the requirements and features of programming L2

UNIT – IV: Control of Manipulators **8 Hrs**

Open-loop and close-loop control, the manipulator control problem, linear control schemes, characteristics of second-order linear systems, linear second-order SISO model of a manipulator joint, joint actuators, partitioned PD control scheme, PID control Scheme, computer Torque control, force control of robotic manipulators, description of force-control tasks, force control strategies, hybrid position/force control, impedance force/torque control.

Learning Outcomes:

At the end of this unit, the student will be able to

- Explain the basic concepts of robot controlling systems. L2
- Outline PD and PID control schemes. L3
- Use the force control strategies to determine the forces in robot. L2
- Explain the force control and torque control techniques. L2

UNIT – V: Robot Vision: **8 Hrs**

Introduction, architecture of robotic vision system, image processing, image acquisition camera, image enhancement, image segmentation, imaging transformation, Camera transformation and calibrations, industrial applications of robot vision.

Learning Outcomes:

At the end of this unit, the student will be able to

- Identify the components of robot vision system. L3
- Explain the concept of image enhancement, segmentation and transformation. L2

- List the various components of robot vision system. **L1**
- Illustrate the industrial applications of robot vision system. **L2**

Text Books:

1. Mikell P. Groover and Mitchell Weiss, Roger N. Nagel,Nicholas G.Odrey , Industrial Robotics — McGraw Hill, 1986.
2. R K Mittal and I J Nagrath, Robotics and control, Illustrated Edition, Tata McGraw Hill India 2003.
3. S.R.DEB

Reference Books:

1. Saeed B. Niku, Introduction to Robotics – Analysis, System, Applications, 2/e, John Wiley & Sons, 2010.
2. H. Asada and J.J.E. Slotine, Robot Analysis and Control, 1/e, Wiley- Inter science, 1986.
3. Robert J. Schillin, Fundamentals of Robotics: Analysis and control, Prentice-Hall Of India Pvt. Limited, 1996.
4. Mohsen shahinpoor, A robot Engineering text book, Harper & Row Publishers,1987.
5. John.J.Craig Addison, Introduction to Robotics: Mechanics and Control, Wesley, 1999.
6. K.S. FU, R.C. Gonzalez and C.S.G Lee, Robotics: Control, sensing, vision, and intelligence. Mc Graw Hill, 1987.
7. Richard D. Klafter, Thomas Robotic Engineering an integrated approach, PHI publications 1988.

Course Outcomes:

At the end of this Course the student will be able to

- Explain fundamentals of Robots. **L2**
- Apply kinematics and differential motions and velocities. **L3**
- Demonstrate control of manipulators. **L2**
- Understand robot vision. **L2**
- Develop robot cell design and programming. **L3**

Online Learning Resources:

- https://nptel.ac.in/courses/112105249
- https://onlinecourses.nptel.ac.in/noc20_de11/preview
- https://nptel.ac.in/courses/112104308
- https://nptel.ac.in/courses/112104288
- https://nptel.ac.in/courses/112101099
- https://www.iare.ac.in/sites/default/files/lecture_notes/ROBOTICS_LECURE_NOTES.pdf

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B.Tech IV Year I Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

20AME65b-NON-CONVENTIONAL SOURCES OF ENERGY

(Open Elective-II)

L	T	P	C
3	0	0	3

Course Objectives: The objectives of the course are to make the students learn about

- Familiarize with concept of various forms of renewable energy.
- Understand division aspects and utilization of renewable energy sources for both domestics and industrial applications.
- Expose the students in an environmental and cost economics of using renewable energy sources compared to fossil fuels.

UNIT – I: Introduction **10 Hrs**

Introduction to energy resources: Role and potential of new and renewable source, the solar energy option, Environmental impact of solar power, physics of the sun, the solar constant, extraterrestrial and terrestrial solar radiation, solar radiation on titled surface, instruments for measuring solar radiation and sun shine, solar radiation data.

Learning Outcomes:

At the end of this unit, the student will be able to

- Explain the basic concepts of solar radiation and solar collectors **L2**
- develop sun path diagrams **L3**
- Explain environmental impact of solar power. **L2**
- Discuss the instruments for measuring solar radiation and sun shine. **L6**

UNIT – II: Solar Energy Collection & Storage **8 Hrs**

Solar Energy Collection: Flat plate and concentrating collectors, classification of concentrating collectors, orientation and thermal analysis, advanced collectors.

Solar Energy Storage and Applications :

Different methods, Sensible, latent heat and stratified storage, solar ponds. Solar Applications solar heating technique, solar distillation and drying, photovoltaic energy conversion.

Learning Outcomes:

At the end of this unit, the student will be able to

- Classify solar energy collectors. **L1**
- Describe orientation and thermal analysis of solar energy collectors. **L2**
- Explain photovoltaic energy conversion. **L2**
- Illustrate the various solar energy applications. **L2**

UNIT – III: Wind Energy & Bio-Mass **8 Hrs**

Wind Energy : Sources and potentials, horizontal and vertical axis windmills, performance characteristics, Betz criteria

Bio-Mass: Principles of Bio-Conversion, Anaerobic/aerobic digestion, types of Bio-gas digesters, gas yield, combustion characteristics of bio-gas, utilization for cooking, I.C. Engine operation and economic aspects.

Learning Outcomes:

At the end of this unit, the student will be able to

- Compare vertical axis and horizontal axis windmills. **L3**
- Illustrate the performance characteristics of vertical axis and horizontal axis windmills. **L2**
- Discus the principles of Bio-conversion. **L6**
- Explain combustion characterises of bio-gas. **L2**

UNIT – IV: Geothermal Energy & Ocean Energy **8 Hrs**

Geothermal Energy: Resources, types of wells, methods of harnessing the energy, potential in India.

Ocean Energy: OTEC, Principles utilization, setting of OTEC plants, thermodynamic cycles. **Tidal and wave energy:** Potential and conversion techniques, mini-hydel power plants, and their economics.

Learning Outcomes:

At the end of this unit, the student will be able to

- Explain the concept of geothermal and ocean energy. **L2**
- Discus OTEC and principles utilization. **L6**
- Explain mini-hydel power plants and their economics. **L2**

UNIT – V: Direct Energy Conversion **8 Hrs**

Need for DEC, Carnot cycle, limitations, principles of DEC. Thermo-electric generators, Seebeck, Peltier and Joule Thomson effects, Figure of merit, materials, applications, MHD generators, principles, dissociation and ionization, hall effect, magnetic flux, Fuel cells, principles, faraday's law's, thermodynamic aspects, selection of fuels and operating conditions.

Learning Outcomes:

At the end of this unit, the student will be able to

- Describe the working principle of MHD engine. **L2**
- Explain constructional details of various thermo-electric generators. **L2**
- Identify the various economic, thermodynamic aspects of electron gas dynamic conversion system. **L3**

Text Books:

1. Tiwari and Ghosal, Renewable energy resources, Narosa Publishing House-2004.
2. G.D. Rai, Non-Conventional Energy Sources, Khanna Publications-1988.

Reference Books:

1. Twidell & Weir, Renewable Energy Sources, Routledge; 3/e, 2015.
2. Sukhatme S.P., Nayak.J.P, 'Solar Energy – Principle of Thermal Storage and collection", Tata McGraw Hill, 2008.
3. Sathyajith Mathew, Wind Energy Fundamentals, Resource Analysis and Economics, Springer Publications, 2006.
4. Wei Tong, Wind Power Generation and Wind Turbine Design, WIT Press, 2010.
5. Wind Power, Revised Edition: Renewable Energy for Home, Farm, and Business, Paul Gipe, Chelsea Green Publishing, 2004.
6. S.S. Rao, B.B. Parulekar, Energy Technology (Non Conventional, Renewable and Conventional), Khanna publications, 1994.

Course Outcomes:

At the end of this Course the student will be able to

- Outline the various economic, thermodynamic aspects of electron gas dynamic conversion system. **L3**
- Explain the basic concepts of solar radiation and solar collectors **L2**
- Discus OTEC and principles utilization. **L6**
- Describe orientation and thermal analysis of solar energy collectors. **L2**

Online Learning Resources:

- https://nptel.ac.in/courses/103103206
- https://nptel.ac.in/courses/108108078
- https://onlinecourses.nptel.ac.in/noc21_ph33/preview
- https://nptel.ac.in/courses/121106014
- https://mrcet.com/downloads/digital_notes/EEE/31082020/IV-I%20SOLAR%20&%20WIND%20ELECTRICAL%20SYSTEMS%20DIGITAL%20NOTES%201.pdf
- https://www.vssut.ac.in/lecture_notes/lecture1428910296.pdf

Head
Mechanical Engineering Department

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

20AEC65a- INTRODUCTION TO MICROCONTROLLER AND APPLICATIONS

(Open Elective-II)

L–T – P - C
3 – 0 – 0 – 3

Course Objective:

- To understand the basic concepts and architecture of 8051.
- To learn various instructions and addressing modes used in 8051
- To be able to program 8051 Timers and implement serial communication for a given application.
- To learn interfacing of memory, I/O devices and the usage of Interrupts.
- To know the basic architecture and interfacing of ARM microcontroller.

UNIT I

Architecture of 8051: Introduction, Block diagram of 8051 Microcontroller, Functions of each block, Pin details of 8051, ALU,ROM, RAM, Memory Organization of 8051, Special function registers, Program Counter, PSW register, Stack, I/O Ports, Timer, Interrupt, Serial Port, Oscillator and Clock, Clock Cycle, Machine Cycle, Instruction cycle, Reset, Power on Reset.

Learning Outcomes:

At the end of the unit, the student will be able to:

- Understand the architecture of 8051 microcontroller.(L2)
- Learn the functions of each block of 8051 microcontroller.(L1)

UNIT II

Instruction Set of 8051: Instruction set of 8051, Classification of 8051 Instructions, Data transfer instructions, Arithmetic Instructions, Logical instructions, Branching instructions, Bit Manipulation Instructions

Assembler and Addressing Modes: Assembling and running an 8051 program, Structure of Assembly Language, Assembler directives, Different addressing modes of 8051. **I/O:** Bit addresses for I/O and RAM, I/O programming, I/O bit manipulation programming.

Learning Outcomes:

At the end of the unit, the student will be able to:

- Know different instructions available in the Instruction set of 8051.(L1)
- Learn and use different types of addressing modes of 8051 microcontroller.(L1)

UNIT III

Timer: Programming 8051 Timers, Timer registers, Different modes of Timer, Programming timer in different modes, Counter programming, Different modes of Counter, Sample programs.

Serial Communication: Basics of Serial communication, UART, RS 232 Protocol, 8051 interface to RS 232, 8051 UART Programming, SPI and I^2C implementation on 8051.

Learning Outcomes:

At the end of the unit, the student will be able to:

- Write programs to use the 8051 Timers for a given application.(L6)
- Use different types of serial communication devices based on the application.(L3)

UNIT IV

Interrupt: 8051 Interrupts, Programming Timer Interrupts, Programming external hardware interrupts, Programming the serial communication interrupt, Interrupt priority in 8051.**IC 8255:** IC 8255, Block Diagram, Modes of 8255, Interfacing with 8051.

Interfacing Techniques: Interfacing external memory to 8051, Sensor interfacing, ADC interfacing, DAC interfacing, Keyboard interfacing, Seven segment LED Display Interfacing, Stepper Motor interfacing.

Learning Outcomes:

At the end of the unit, the student will be able to:

- Interface memory and I/O devices for specific applications.(L4)
- Learn and apply Interrupts based on the application and usage.(L3)

UNIT V

ARM Cortex-M Microcontrollers: A Memory-centric System Model. Basics of Chip Design. The Arm Cortex-M Processor Architecture. Interconnects. The Advanced Microcontroller Bus Architecture (AMBA). Interfacing with the External World. Peripherals. Memory System. FPGA SoC Architecture.

Learning Outcomes:

At the end of the unit, the student will be able to:

- Learn about the ARM based processor and its architecture.(L3)
- Interface ARM controllers for practical applications.(L3)

TEXT BOOKS

1. Muhammed Ali Mazidi, Janice GillispieMazidi andRolin D McKinlay, "The 8051 Microcontroller and Embedded Systems Using Assembly and C", 2nd Edition, Pearson Education, 2008.
2. Ajit pal, "Microcontrollers, Principles and Applications", – PHI Ltd., - 2011.

REFERENCE BOOKS

1. Ajay V Deshmukh, "Microcontrollers: Theory and Applications", TATA McGraw Hill publications, 2007.
2. Krishna Kanth, "Microprocessors and Microcontrollers", PHI Publications, 2010
3. Fundamentals of System-on-Chip Design on Arm Cortex-M Microcontrollers Paperback – 2 Aug. 2021by Rene Beuchat , Andrea Guerrieri , SahandKashani.

Course outcomes:

At the end of this course, the students will be able to

- Understand the basic concepts and architecture of 8051.(L2)
- Know the usage of various instructions and addressing modes in 8051(L1)
- Program 8051 Timers and implement serial communication for a given application.(L6)
- Interface memory, I/O devices and use Interrupts.(L4).
- Learn the basic architecture and interfacing of ARM microcontroller(L3).

B.Tech IV Year I Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

20AEC65b- PRINCIPLES OF DIGITAL SIGNAL PROCESSING

(Open Elective-II)

L–T – P - C
3 – 0 – 0 – 3

Course Objectives:

- To understand the frequency domain analysis of discrete time signals.
- To learn the properties of discrete fourierseries and fourier transforms.
- To design & analyze IIR digital filters from analog filters.
- To know various structures used in implementation of FIR digital filters.
- To grasp the importance and applications of Multirate Digital signal processing.

UNIT I

Introduction to Digital Signal Processing: Discrete time signals & sequences, Classification of Discrete time systems, stability of LTI systems, LTI system Properties. Solution of Linear constant coefficient difference equations, frequency domain representation of discrete time signals and systems. Review of Z-transforms.

Learning Outcomes:

At the end of the unit, the student will be able to:

- Analyze and process signals in the discrete domain.(L4)
- Determine time domain representations and frequency domain analysis of discrete-time signals and systems (L3)

UNIT II

Discrete Fourier Series and Fourier Transforms: Properties of discrete Fourier series, DFS representation of periodic sequences, Discrete Fourier transforms: Properties of DFT, linear filtering methods based on DFT, Fast Fourier transforms (FFT) - Radix-2 decimation in time and decimation in frequency FFT Algorithms, Inverse FFT.

Learning Outcomes:

At the end of the unit, the student will be able to:

- Understand the pproperties of discrete fourier series.(L2)
- Describe DFT using FFT algorithms.(L1)

UNIT III

Design of IIR Digital Filters and Realizations: Analog filter approximations – Butter worth and Chebyshev, Design of IIR Digital filters from analog filters, Design Examples, Analog and Digital frequency transformations. Basic structures of IIR systems, Transposed forms.

Learning Outcomes:

At the end of the unit, the student will be able to:

- Design IIR digital filters from analog filters.(L6)
- Construct IIR digital filters with different realization techniques.(L6)

UNIT IV

Design of FIR Digital Filters and Realizations: Characteristics of FIR Digital Filters, frequency response. Design of FIR digital filters using window techniques and frequency sampling technique, comparison of IIR & FIR filters, basic structures of FIR systems.

Learning Outcomes:

At the end of the unit, the student will be able to:

- Design FIR digital filters using window techniques.(L6)
- Construct the basic structures of FIR systems.(L6)

UNIT V

DSP Applications: Introduction to programmable DSPs, Multirate signal processing: Decimation, Interpolation, Sampling rate conversion by a rational factor; Adaptive filters: Introduction, Basic principles of Forward Linear Predictive filter and applications such as system identification, echo cancellation, equalization of channels, and beam forming using block diagram representation study only.

Learning Outcomes:

At the end of the unit, the student will be able to:

- Apply Interpolation and Decimation with help of sampling and filtering.(L3)
- Understand the principle and applications of Forward Linear Predictive filter.(L2)

Text Books:

1. John G. Proakis andDimitris G. Manolakis, "Digital Signal Processing, Principles, Algorithmsand Applications", Pearson Education, 2007.
2. A.V.Oppenheim and R.W. Schaffer, "Discrete Time Signal Processing",PHI.
3. B.Venkataramani and M. Bhaskar, "Digital Signal Processors – Architecture, Programming and Applications", TATA McGraw Hill, 2002.

References:

1. Andreas Antoniou, "Digital Signal Processing", TATA McGraw Hill, 2006
2. MH Hayes, "Digital Signal Processing", Schaum's Outline series, TATA Mc-Graw Hill, 2007.
3. Robert J. Schilling and Sandra L. Harris, "Fundamentals of Digital Signal Processing using Matlab", Thomson, 2007.

Course outcomes:

At the end of this course, the students will be able to

- Articulate the frequency domain analysis of discrete time signals.(L3)
- Understand the properties of discrete fourierseries and fourier transforms.(L2)
- Design& analyze IIR digital filters from analog filters.(L6)
- Design various structures used in implementation of FIR digital filters.(L6)
- Summarize the importance and applications of Multirate Digital signal processing.(L2)

Department of Computer Science and Engineering R20

B.Tech III Year II Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS)::PULIVENDULA

20ACS65A- MACHINE LEARNING APPLICATIONS

(Open Elective-II)

L	T	P	C
3	0	0	3

Course Objectives:

- To be able to formulate machine learning problems corresponding to different applications.
- To understand a range of machine learning algorithms along with their strengths and weaknesses.
- To understand the basic theory underlying machine learning.

UNIT-I: INTRODUCTION

Introduction: An illustrative learning task, and a few approaches to it. What is known from algorithms? Theory, Experiment. Biology. Psychology. Overview of Machine learning, related areas and applications. Linear Regression, Multiple Regression, Logistic Regression, logistic functions.

Learning Outcomes:

At the end of this unit, the student will be able to

- Argue the importance and role of software architecture in large-scale software systems. **L2**
- Design and motivate software architecture for large-scale software systems. **L3**

UNIT-II: DECISION TREE LEARNING

Decision Tree Learning: - Minimum Description Length Principle. Occam's razor. Learning with active queries Introduction to information theory, Decision Trees, Cross Validation and Over fitting. Neural Network Learning: Perceptions and gradient descent back propagation, multilayer networks and back propagation.

Learning Outcomes:

At the end of this unit, the student will be able to

- Design and motivate software architecture for large-scale software systems. **L3**
- Recognize major software architectural styles and frameworks. **L4**

UNIT-III SAMPLE COMPLEXITY AND OVER FITTING

Sample Complexity and Over fitting: Errors in estimating means. Cross Validation and jackknifing VC dimension. Irrelevant features: Multiplicative rules for weight tuning. Support Vector Machines: functional and geometric margins.

Learning Outcomes:

At the end of this unit, the student will be able to

- Recognize major software architectural styles and frameworks. **L3**
- Describe a software architecture using various documentation approaches and architectural description languages. **L4**

UNIT-IV: INSTANCE-BASED TECHNIQUES

Instance-based Techniques: Lazy vs. eager generalization. K nearest neighbor, case- based reasoning. Clustering and Unsupervised Learning: K-means clustering, Gaussian mixture density estimation, model selection

Learning Outcomes:

At the end of this unit, the student will be able to

- Describe a software architecture using various documentation approaches and architectural description languages. **L5**
- Generate architectural alternatives for a problem and selection among them. **L3**

UNIT-V: Genetic Algorithms

Genetic Algorithms: Different search methods for induction - Explanation-based Learning: using prior knowledge to reduce sample complexity. Dimensionality reduction: feature selection, principal component analysis.

Learning Outcomes:

At the end of this unit, the student will be able to

- Use well-understood paradigms for designing new systems. **L3**
- Identify and assess the quality attributes of a system at the architectural level. **L4**

Text Books:

1. Tom Michel, Machine Learning, McGraw Hill, 1997
2. Trevor Has tie, Robert Tibshirani & Jerome Friedman. The Elements of Statically Learning, Springer Verlag, 2001.

Reference Books:

1. Machine Learning Methods in the Environmental Sciences, Neural Networks, William W Hsieh, Cambridge Univ Press.
2. Richard o. Duda, Peter E. Hart and David G. Stork, pattern classification, John Wiley & Sons Inc.,2001
   3. Chris Bishop, Neural Networks for Pattern Recognition, Oxford University Press, 1995.

Course Outcomes:

At the end of this Course the student will be able to

- Student should be able to understand the basic concepts such as decision trees and neural networks.Ability to formulate machine learning techniques to respective problems. **L2**
- Apply machine learning algorithms to solve problems of moderate complexity. **L3**

B.Tech III Year II Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS)::PULIVENDULA

20ACS65B- OBJECT ORIENTED PROGRAMMING

(Open Elective-II)

L	T	P	C
3	0	0	3

Course Objectives:

- Study the syntax, semantics and features of Java Programming Language
- Study the Object Oriented Programming Concepts of Java Programming language
- Learn the method of creating Multi-threaded programs and handle exceptions
- Learn Java features to create GUI applications & perform event handling

UNIT-I: INTRODUCTION

Introduction to Java: The key attributes of object oriented programming, simple program, The Java keywords, Identifiers, Data types and operators, Program control statements, Arrays, Strings, String Handling

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand the basics of computer graphics, different graphics systems and applications of computer graphics. **L2**
- Discuss various algorithms for scan conversion and filling of basic objects and their comparative analysis. **L3**

UNIT-II: CLASSES

Classes: Classes, Objects, Methods, Parameters, Constructors, Garbage Collection, Access modifiers, Pass Objects and arguments, Method and Constructor Overloading, Understanding static, Nested and inner classes.

Learning Outcomes:

At the end of this unit, the student will be able to

- Use of geometric transformations on graphics objects and their application in composite form. **L2**
- Extract scene with different clipping methods and its transformation to graphics display device. **L3**

UNIT-III INHERITANCE

Inheritance – Basics, Member Access, Usage of Super, Multi level hierarchy, Method overriding, Abstract class, Final keyword.

Learning Outcomes:

At the end of this unit, the student will be able to

- Explore projections and visible surface detection techniques for display of 3D scene on 2D screen. **L3**
- Render projected objects to naturalize the scene in 2D view and use of illumination models for this **L4**

UNIT-IV: INTERFACES

Interfaces – Creating, Implementing, Using, Extending, and Nesting of interfaces.

Packages – Defining, Finding, Member Access, Importing

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand the basics of Multimedia basics, different graphics systems and applications of computer graphics. **L5**
- Discuss various multimedia datastructures. **L5**

UNIT-V: EXCEPTION HANDLING

Exception handling: Hierarchy, Fundamentals, Multiple catch clauses, subclass exceptions, Nesting try blocks, Throwing an exception, Using Finally and Throws, Built-in exceptions, User-defined exceptions.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand the basics of Multimedia Authoring systems **L4**
- Understand the how videos are placed **L5**

Text Books:

1. "Java Fundamentals - A Comprehensive Introduction", Herbert Schildt and Dale Skrien, Special Indian Edition, McGrawHill, 2013.
2. "Java The Complete Reference" Herbert Schildt, 8th Edition, 2011, Oracle press, TataMcGraw-Hill
3. "Java – How to Program", Paul Deitel, Harvey Deitel, PHI.

Reference Books:

1. "Programming with Java" T.V.Suresh Kumar, B.Eswara Reddy, P.Raghavan Pearson Edition.
2. "Core Java", Nageswar Rao, Wiley Publishers.
3. "Thinking in Java", Bruce Eckel, Pearson Education.
4. "A Programmers Guide to Java SCJP", Third Edition, Mughal, Rasmussen, Pearson.
5. "Head First Java", Kathy Sierra, Bert Bates, O'Reilly
6. "SCJP – Sun Certified Programmer for Java Study guide" – Kathy Sierra, Bert Bates, McGrawHill
7. "Java in Nutshell", David Flanagan, O'Reilly
8. "Core Java : Volume I – Fundamentals, Cay S. Horstmann, Gary Cornell, The Sun Micro Systems Press

Course Outcomes:

At the end of this Course the student will be able to

Introduction to computer graphics

- Gain knowledge of client-side scripting, validation of forms and AJAX programming **L3**
- Understand server-side scripting with PHP language **L4**
- Understand what XML is and how to parse and use XML Data with Java **L5**
- To introduce Server-side programming with Java Servlets and JSP **L6**

B.Tech III Year II Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS)::PULIVENDULA

20ACS65C- WEB DESIGN

(Open Elective-II)

L	T	P	C
3	0	0	3

Course Objectives:

- To Learn the basic concepts in HTML, CSS, JavaScript
- To Understand the responsive design and development
- To learn the web project management and maintenance process
- To Design a Website with HTML, JS, CSS / CMS - Word press

UNIT-I: WEB DESIGN - HTML MARKUP FOR STRUCTURE

Working of Web - HTML Markup for Structure - Creating simple page - Marking up text - Adding Links - Adding Images - Table Markup - Forms - HTML5.

Learning Outcomes:

At the end of this unit, the student will be able to

- Argue the importance and role of software architecture in large-scale software systems. **L2**
- Design and motivate software architecture for large-scale software systems. **L3**

UNIT-II: CSS AND JAVASCRIPT

CSS - Formatting text - Colours and Background - Padding, Borders and Margins – Floating and positioning - Page Layout with CSS - Transition, Transforms and Animation – JavaScript - Using Java Script.

Learning Outcomes:

At the end of this unit, the student will be able to

- Design and motivate software architecture for large-scale software systems. **L3**
- Recognize major software architectural styles and frameworks. **L4**

UNIT-III RESPONSIVE WEB DESIGN

Sass for Responsive Web Design - Marking Content with HTML5 - Mobile-First or DesktopFirst - CSS Grids, CSS Frameworks, UI Kits, and Flexbox for RWD - Designing small UIs by Large Finger - Images and Videos in Responsive Web Design - Meaningful Typography for Responsive Web Design.

Learning Outcomes:

At the end of this unit, the student will be able to

- Recognize major software architectural styles and frameworks. **L3**
- Describe a software architecture using various documentation approaches and architectural description languages. **L4**

UNIT-IV: WEB PROJECT MANAGEMENT

Project Life Cycle - Project Definition - Discovery and Requirements - Project Schedule and Budgeting - Running the project - Technical Documentation - Development, Communicaton, Documentation - QA and testing -Deployment - Support and operations.

Learning Outcomes:

At the end of this unit, the student will be able to

- Describe a software architecture using various documentation approaches and architectural description languages. **L5**
- Generate architectural alternatives for a problem and selection among them. **L3**

UNIT-V: PROJECT CASE STUDY

Using HTML, CSS, JS or using Opensource CMS like Word press, design and develop a Website having Aesthetics, Advanced and Minimal UI Transitions based on the project - Host and manage the project live in any public hosting.

Learning Outcomes:

At the end of this unit, the student will be able to

- Use well-understood paradigms for designing new systems. **L3**
- Identify and assess the quality attributes of a system at the architectural level. **L4**

Text Books:

1. Jennifer Niederst Robbins, "Learning Web Design", O'REILLY 4th Edition
2. Ricardo Zea, "Mastering Responsive Web Design", PACKT Publishing, 2015
3. Justin Emond, Chris Steins, "Pro Web Project Management", Apress,2011

Reference Books:

1. Jon Duckett, "HTML and CSS: Design and Build Websites", John Wiley and Sons, edition 2014
2. Jon Duckett, Jack Moore, "JavaScript & JQuery: Interactive Front-End Web Development", John Wiley and Sons, edition 2014
3. Uttam K. Roy "Web Technologies" Oxford University Press, 13th impression, 2017 4. Word press - http://www.wpbeginner.com/category/wp-tutorials/

Course Outcomes:

At the end of this Course the student will be able to

- Recognize the method of using layered approach for design . **L2**
- Explain the functionality of each layer of a computer network. **L3**
- Apply the knowledge of layered approach for the design of computer network software. **L4**
- Analyze the performance of protocols of a computer network. **L4**
- Recommend the protocols for different applications. **L5**
- Propose new protocols for a computer networks. **L6**

B.Tech IV Year I Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

20AEC71a- ARTIFICIAL INTELLIGENCE AND NEURAL NETWORKS

(Professional Elective-III)

L–T – P - C
3 – 0 – 0 – 3

Course Objectives:

1. To learn the differences between structure of agents & problem solving agents.
2. To solve problems with uniformed search strategies & Heuristic search.
3. To be able to solve Inference in first order logic.
4. To understand the development of Neural Networks with basic principles.
5. To acquire knowledge on Feed forward &Feedback Neural Networks.

UNIT – I

Introduction: AI problems, foundation of AI and history of AI intelligent agents: Agents and Environments, the concept of rationality, the nature of environments, structure of agents, problem solving agents, problem formulation.

Learning Outcomes:

At the end of the unit, the student will be able to:

- Gain knowledge on basics and problems of Artificial Intelligence.(L1)
- Analyze the concept of rationality and structure of problem solving agents. (L4)

UNIT – II

Searching: Searching for solutions, uniformed search strategies – Breadth first search, depth first Search. Search with partial information (Heuristic search), Knowledge Representation & Reasons logical Agents, Knowledge – Based Agents, the Wumpus world, logic, propositional logic, reasoning patterns in propositional logic, Resolution, Forward & Backward Chaining.

Learning Outcomes:

At the end of the unit, the student will be able to:

- Know how to search for solutions using knowledge based agents.(L1)
- Analyze reasoning patterns in propositional logic, Forward and Backward Chaining.(L4)

UNIT – III

First Order Logic : Inference in first order logic, propositional Vs. first order inference, unification & lifting forward chaining, Backward chaining, Resolution.

Learning Outcomes:

At the end of the unit, the student will be able to:

- Gain knowledge on Inference concept present in first order logic.(L1)
- Analyze the differences between propositional & first order inference. (L4)

UNIT – IV

Characteristics Of Neural Networks : Historical Development of Neural Networks Principles, Artificial Neural Networks: Terminology, Models of Neuron, Topology, Basic Learning Laws, Pattern Recognition Problem, Basic Functional Units, Pattern Recognition Tasks by the Functional Units.

Learning Outcomes:

At the end of the unit, the student will be able to:

- Articulate the structure of Artificial Neural Networks with working principles.(L3)
- Identify the importance of models of Neuron, topology &basic learning laws.(L1)

UNIT – V

Feed forward Neural Networks: Introduction, Analysis of pattern Association Networks, Analysis of Pattern Classification Networks, Analysis of Pattern Mapping Networks.

Feedback Neural Networks: Introduction, Analysis of Linear Auto associative FF Networks, Analysis of Pattern Storage Networks.

Learning Outcomes:

At the end of the unit, the student will be able to:

- Differentiate Feed forward Neural Networks & Feedback Neural Networks.(L4)
- Analyze the Pattern Association, Classification & Mapping Networks.(L4)

TEXT BOOKS:

1. Stuart Russel and Peter Norvig, "Artificial Intelligence – A Modern Approach", Second Edition, PHI/ Pearson Education.2009.
2. B. YagnaNarayana, "Artificial Neural Networks", PHI, 2006.

REFERENCES:

1. E.Rich and K.Knight, "Artificial Intelligence", 2nd Edition, Tata McGraw Hill,
2. Simon Haykin, "Neural Networks", PHI, 2009

Course Outcomes:

At the end of this course, the students will be able to

- Contrast the differences between structure of agents & problem solving agents.(L4)
- Solve problems with uniformed search strategies & Heuristic search.(L3)
- Analyze the problems of inference in first order logic.(L4)
- Understand the development of Neural Networks with basic principles.(L2)
- Acquire knowledge on Feed forward &Feedback Neural Networks.(L1)

B.Tech IV Year I Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

20AEC71b- DIGITAL IMAGE PROCESSING

(Professional Elective-III)

L–T – P - C
3 – 0 – 0 – 3

Course Objectives:

- To learn the fundamentals of Image Processing and the image transforms used in image processing.
- To study the different types of filtering techniques used for image enhancement.
- To gain an understanding of image restoration techniques.
- To understand the techniques used for image segmentation and image restoration.
- To analyze various types of image compression methods.

UNIT-I:

Digital Image Fundamentals: Elements of digital image processing systems, An image model, Basic relationships between pixels and basic transformation, Image acquisition, sampling and quantization, Image file formats Two dimensional convolution, Two dimensional correlation, Two dimensional frequency responses.

Image Transforms: Study analysis with examples of 2D transforms, Transforms: DFT, DCT, Discrete Sine, Walsh, Hadamard, Slant, Haar, KLT, Radon, Hough, and Wavelet

Learning Outcomes:

At the end of the unit, the student will be able to:

- Learn the fundamentals of digital image processing.(L1)
- Analyze different types of image transforms in one and two dimensions. (L4)

UNIT-II:

Image Enhancement: Image enhancement through – point processing, Histogram processing, spatial filtering, Enhancement in frequency domain, image smoothing, image sharpening

Learning Outcomes:

At the end of the unit, the student will be able to:

- Explain the enhancements techniques in both spatial and frequency domain.(L3)
- Analyze various types of filters used in spatial and frequency domain. (L4)

UNIT-III:

Image Restoration: Noise distributions, Degradation model, Unconstrained and constrained restoration, Inverse filtering, minimum mean square error (Wiener) filtering, Constrained least square restoration

Learning Outcomes:

At the end of the unit, the student will be able to:

- Understand the image restoration procedure.(L2)
- Learn about thedifferent types of image restoration filters.(L1)

UNIT-IV:

Image Segmentation and Recognition: Edge detection, Image segmentation: Region growing, Region splitting and merging, Edge linking, Morphological operations: Dilation, Erosion, Opening, Closing, Image recognition: Patterns and pattern classes, Matching by minimum distance classifier, Statistical classifier, Matching by correlation.

Learning Outcomes:

At the end of the unit, the student will be able to:

- Learn the image segmentation techniques and their applications.(L1)
- Understand the various types of Image recognition patterns.(L2)

UNIT-V:

Image Compression: Need for image compression, Image coding, Huffman coding, Run length encoding, Arithmetic encoding, Vector Quantization, Block truncation coding, Transform coding: DCT, Wavelet, Image compression standards

Unit Outcomes:Learning Outcomes:

At the end of the unit, the student will be able to:

- Understand the need for image compression.(L2)
- Analyze different types of image compression algorithms. (L4)

TEXT BOOKS:

1. R. C. Gonzalez and R.E. Woods, "Digital Image Processing", 3rd Edition, Addison Wesley/Pearson education, 2010.
2. A. K. Jain, "Fundamentals of Digital Image processing", PHI, 1994.

REFERENCES:

1. Rafael C. Gonzalez, Richard E woods and Steven L. Eddins, "Digital Image processing using MATLAB", 2nd Edition, Tata McGraw Hill, 2010.
2. William K. Pratt, "Digital Image Processing", 3rd Edition, John Wilely, 2004.

Course Outcomes:

At the end of this course, the students will be able to

- Relate the fundamentals of Image Processing and the image transforms.(L3)
- Correlatedifferent types of filtering techniques used for image enhancement.(L3)
- Gain an understanding of image restoration techniques.(L1)
- Understand the techniques used for image segmentation and image restoration.(L2)
- Analyze various types of image compression methods.(L4)

B.Tech IV Year I Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

20AEC71c- SATELLITE COMMUNICATIONS

(Professional Elective-III)

L–T – P - C
3 – 0 – 0 – 3

Course Objectives:

- To gain an understanding of the basic principles and applications of satellite communications.
- To learn about the satellite subsystems and analyze the link budget.
- To introduce to the working and applications of the systems used in the earth station.
- To study the different multiple access techniques used in satellite communications.
- To know the basic concepts of satellite navigation and working of global positioning system.

UNIT-I

Introduction to Satellite Communications: Origin of satellite communications, basic concepts of satellite communications, and frequency allocations for satellite services, applications, future trends of satellite communications. Orbital Mechanics look angle determination, orbital perturbations, orbit determination, launches and launch vehicles, orbital effects in communication systems performance.

Learning Outcomes:

At the end of the unit, the student will be able to:

- Summarize the basic principles of satellite communications.(L2)
- Learn the Orbital Mechanics and applications of satellite communications.(L1)

UNIT-II

Satellite Subsystems and Link Design: Altitude and orbital control system, Telemetry, Tracking, command and monitoring, power systems, communication subsystems, satellite antenna equipment reliability and space qualification.Basic transmission theory, system noise temperature and G/T ratio, design of down links, uplink design, design of satellite links for specified C/N, system design example.

Learning Outcomes:

At the end of the unit, the student will be able to:

- Understand the functioning of various satellite subsystems. (L2)
- Learn the design of satellite links for specified C/N.(L1)

UNIT-III

Earth Station Technology: Introduction, transmitters, receivers, Antennas, tracking systems, terrestrial interface, primary power test methods, comparison of LEO and GEO satellite systems in real world.

Learning Outcomes:

At the end of the unit, the student will be able to:

- Know about the various systems used in the earth station.(L1)
- Compare the LEO and GEO satellite systems.(L2)

UNIT-IV

Multiple Access: Frequency division multiple access (FDMA), Intermodulation, calculation of C/N, Time Division multiple access (TDMA) frame structure, examples. Satellite switched TDMA onboard processing, DAMA, code division multiple access (CDMA), spread spectrum transmission and reception.

Learning Outcomes:

At the end of the unit, the student will be able to:

- Learn about the different multiple access techniques used in satellite communications. (L1)
- Understand the Satellite switched TDMA onboard processing.(L2)

UNIT-V

Satellite Navigation & Global Positioning System: Radio and satellite navigation, GPS position location principles, GPS receivers and codes, satellite signal acquisition, GPS navigation message, GPS signal levels, GPS receiver operation, GPS C/A code accuracy, differential GPS.

Learning Outcomes:

At the end of the unit, the student will be able to:

- Know about the basic concepts of satellite navigation (L1)
- Understand the working and applications of global positioning system.(L2)

TEXT BOOKS:

1. Timothi Pratt, Charles Bostian and Jeremy Allnutt, "Satellite communications", 2nd Edition, WSE, Wiley publications, 2003.
2. Wilbur L.Prichard, Robert A. Nelson and Henry G.Suyderhoud, "Satellite communications Engineering", 2nd Edition, Pearson Publications, 2003.

REFERENCES:

1. Dennis Roddy, "Satellite communications", 2nd Edition, McGraw Hill, 1996.
2. K.N.Raja Rao, "Fundamentals of Satellite communications", PHI, 2004.

Course Outcomes:

At the end of this course, the students will be able to

- Understandthe basic principles and applications of satellite communications.(L2)
- Learn about the satellite subsystems and know how to analyze the link budget.(L1)
- Appreciate the working and applications of the systems used in the earth station.(L2)
- Gain the knowledge about the multiple access techniques used in satellite communications. (L1)
- Understand the basic concepts of satellite navigation and working of global positioning system.(L2)

B.Tech IV Year I Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

20AEC72a- RADAR SYSTEMS

(Professional Elective-IV)

L–T – P - C
3 – 0 – 0 – 3

Course Objectives:

- Understand the basic working principle of Radar and target detection procedure.
- Learn about the working and applications of CW and Frequency modulated Radar.
- Comprehend the working and applications of MTI and Pulse Doppler Radar
- Understand different methods of tracking a target and their limitations.
- Analyze the effect of noise at the receiver and uses of phased array antennas.

UNIT I

Basics of Radar: Introduction, Maximum Unambiguous Range, Simple form of Radar Equation, Radar Block Diagram and Operation, Radar Frequencies and Applications, Prediction of Range Performance, Minimum Detectable Signal, Receiver Noise, Modified Radar Range Equation, Illustrative Problems. Radar Equation: SNR, Envelope Detector, False Alarm Time and Probability, Integration of Radar Pulses, Radar Cross Section of Targets (simple targets - sphere, cone-sphere), Transmitter Power, PRF and Range Ambiguities, System Losses (qualitative treatment), Illustrative Problems.

Learning Outcomes:

At the end of the unit, the student will be able to:

- Learn the basic working principle of Radar and target detection procedure.(L1)
- Understand the target detection procedure using a Radar.(L2)

UNIT II

CW and Frequency Modulated Radar: Doppler Effect, CW Radar – Block Diagram, Isolation between Transmitter and Receiver, Non-zero IF Receiver, Receiver Bandwidth Requirements, Applications of CW radar, Illustrative Problems.FM-CW Radar, Range and Doppler Measurement, Block Diagram and Characteristics (Approaching/ Receding Targets), FM-CW altimeter, Multiple Frequency CW Radar.

Learning Outcomes:

At the end of the unit, the student will be able to:

- Understand the concept and application of DopplerEffect.(L2)
- Appreciate the working and applications of CW and Frequency modulated Radar.(L1)

UNIT III

MTI and Pulse Doppler Radar: Introduction, Principle, MTI Radar with - Power Amplifier Transmitter and Power Oscillator Transmitter, Delay Line Cancellers – Filter Characteristics, Blind Speeds, Double Cancellation, And Staggered PRFs. Range Gated Doppler Filters, MTI Radar Parameters, Limitations to MTI Performance,MTI versus Pulse Doppler radar.

Learning Outcomes:

At the end of the unit, the student will be able to:

- Know the working and applications of MTI Radar. (L1)
- Compare the performances of MTI and Pulse Doppler Radar. (L2)

UNIT IV

Tracking Radar: Tracking with Radar, Sequential Lobing, Conical Scan, Monopulse Tracking Radar – Amplitude Comparison Monopulse (one- and two-coordinates), Phase Comparison Monopulse, Tracking in Range, Acquisition and Scanning Patterns, Comparison of Trackers.

Learning Outcomes:

At the end of the unit, the student will be able to:

- Learn how to track a target using a Radar. (L1)
- Compare different methods of tracking a target. (L2)

UNIT V

Detection of Radar Signals in Noise: Introduction, Noise Figure and Noise Temperature, Matched Filter Receiver – Response Characteristics and Derivation, Correlation detection, Detection criteria, Detector Characteristics, Automatic Detection, Constant False Alarm Rate Receiver.

Radar Receivers: Displays – types. Duplexer – Branch type and Balanced type, Circulators as Duplexers. Introduction to Phased Array Antennas- Basic Concepts, Electronically Steered Phased Array Antennas, Phase Shifters, Frequency – scan Arrays, Radiation for Phased Array, Architecture for Phased Arrays. Radiation Pattern. Beam Steering and Beam Width changes.

Learning Outcomes:

At the end of the unit, the student will be able to:

- Analyze the effect of noise at the receiver in Radar signals.(L4)
- Understand the uses of phased array antennas at the Radar receiver.(L2)

TEXT BOOKS:

1. Merrill I. Skolnik, "Introduction to Radar Systems", 2nd Edition, TMH Special Indian Edition, 2007.
2. Byron Edde, "Radar Principals, Technology, Applications", Pearson Education, 1992.

REFERENCES:

1. Peebles, "Radar Principles", Wiley, New York, 1998.
2. G.S.N.Raju, "Radar Engineering and Fundamentals of Navigational Aids", I. K. International Pvt. Ltd.
3. G. SasiBhushan Rao, " Microwave and Radar Engineering", Pearson Education, 2014

Course Outcomes:

At the end of this course, the students will be able to

- Learn the basic working principle of Radar and target detection procedure.(L2)
- Know the working and applications of CW and Frequency modulated Radar.(L2)
- Gain the knowledge of about MTI and Pulse Doppler Radar.(L1)
- Understand different methods of tracking a target and their limitations.(L2)
- Analyze the effect of noise at the receiver and uses of phased array antennas.(L4)

B.Tech IV Year I Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

20AEC72b- DSP PROCESSORS & ARCHITECTURES

(Professional Elective-IV)

L–T – P - C
3 – 0 – 0 – 3

Course Objectives:

- To learn the basics of DSP systems and compute the accuracy in implementations.
- To understand thearchitectural features of programmable DSP Processors and execution control.
- To study the commercial DSP Processing devices.
- To analyze the implementation of DSP and FFT algorithms.
- To learn the interfacing techniques of memory and I/O devices to programmable DSP Processors.

UNIT-I

Introduction to Digital Signal Processing: Introduction, a Digital signal-processing system, the sampling process, Discrete time sequences. Discrete Fourier Transform (DFT) and Fast Fourier Transform (FFT), linear time-invariant systems, Digital filters, Decimation and interpolation, Analysis and Design tool for DSP Systems MATLAB, DSP using MATLAB.

Computational Accuracy in DSP Implementations: Number formats for signals and coefficients in DSP systems, Dynamic Range and Precision, Sources of error in DSP implementations, A/D Conversion errors, DSP Computational errors, D/A Conversion Errors, Compensating filter.

Learning Outcomes:

At the end of the unit, the student will be able to:

- Analyze linear time-invariant systems and realize various digital filters.(L4)
- Know about various sources of error in DSP implementations.(L1)

UNIT-II

Architectures for Programmable DSP Devices: Basic Architectural features, DSP Computational Building Blocks, Bus Architecture and Memory, Data Addressing Capabilities, Address Generation Unit, Programmability and Program Execution, Speed Issues, Features for External interfacing.

Execution Control and Pipelining: Hardware looping, Interrupts, Stacks, Relative Branch support, Pipelining and Performance, Pipeline Depth, Interlocking, Branching effects, Interrupt effects, Pipeline Programming models.

Learning Outcomes:

At the end of the unit, the student will be able to:

- Understand the basic architectural features of DSP devices. (L2)
- Analyze data addressing capabilities and execution control. (L4)

UNIT-III

Programmable Digital Signal Processors : Commercial Digital signal-processing Devices, Data Addressing modes of TMS320C54XX DSPs, Data Addressing modes of TMS320C54XX Processors, Memory space of TMS320C54XX Processors, Program Control, TMS320C54XX instructions and Programming, On- Chip Peripherals, Interrupts of TMS320C54XX processors, Pipeline Operation of TMS320C54XX Processors.

Learning Outcomes:

At the end of the unit, the student will be able to:

- Explain various data addressing modes of TMS320C54XX processors.(L3)
- Understand the program control and pipeline operationof TMS320C54XX processors.(L2)

UNIT-IV

Implementations of Basic DSP Algorithms : The Q-notation, FIR Filters, IIR Filters, Interpolation Filters, Decimation Filters, PID Controller, Adaptive Filters, 2-D Signal Processing.

Implementation of FFT Algorithms : An FFT Algorithm for DFT Computation, A Butterfly Computation, Overflow and scaling, Bit-Reversed index generation, An 8-Point FFT implementation on the TMS320C54XX, Computation of the signal spectrum.

Learning Outcomes:

At the end of the unit, the student will be able to:

- Understand the structural differences between FIR filters and IIR filters.(L2)
- Implement the 8-point FFT on TMS320C54XXprocessor.(L6)

UNIT-V

Interfacing Memory and I/O Peripherals to Programmable DSP Devices: Memory space organization, External bus interfacing signals, Memory interface, Parallel I/O interface, Programmed I/O, Interrupts and I/O, Direct memory access (DMA). A Multichannel buffered serial port (McBSP), McBSP Programming, a CODEC interface circuit, CODEC programming, A CODEC-DSP interface example.

Learning Outcomes:

At the end of the unit, the student will be able to:

- Interface the memory to programmable DSP Processors.(L4)
- Interface the I/O devices in different modes to programmable DSP Processors.(L4)

TEXT BOOKS:

1. Avtar Singh and S. Srinivasan, "Digital Signal Processing Implementation", 1st Edition, Cengage Learning, 2004.
2. Lapsley et al. S. Chand and Co, "DSP Processor Fundamentals, Architectures & Features", 2000.

REFERENCES:

1. B. Venkata Ramani and M. Bhaskar, "Digital Signal Processors, Architecture, Programming and Applications", TMH, 2004.
2. Jonatham Stein, "Digital Signal Processing: A Computer Science Perspective", John Wiley, 2000.

Course Outcomes:

At the end of this course, the students will be able to

- Summarize the basics of DSP systems and computation of accuracy in implementation.(L2)
- Understand thearchitectural features of programmable DSP Processors and execution control.(L2)
- Select and use the commercial DSP Processing devices for specific applications.(L3)
- Analyze the implementation of DSP and FFT algorithms.(L4)
- Interface memory and I/O devices to programmable DSP Processors.(L4)

B.Tech IV Year I Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

20AEC72c- CELLULAR & MOBILE COMMUNICATIONS

(Professional Elective-IV)

L–T – P - C
3 – 0 – 0 – 3

Course objectives:

- To comprehend the basic elements of cellular and mobile communications.
- To introduce about Co-channel interference and cell splitting in cellular communication.
- To gain an understanding of signal coverage and propagation losses.
- To learn about frequency management, channel assignment and the antennas used at cell site and mobile.
- To introduce types of digital cellular networks and hands off mechanism.

UNIT I

Cellular Mobile Radio Systems: Introduction to Cellular Mobile system, basic cellular system, performance criteria, uniqueness of mobile radio environment, operation of cellular systems, Hexagonal shaped cells, Analog and Digital Cellular systems.

Learning Outcomes:

At the end of the unit, the student will be able to:

- Understand basic concepts of cellular and mobile communications.(L2)
- Know about cell shape, Analog and Digital Cellular systems. (L1)

UNIT II

Elements of Cellular Radio System Design: General description of the problem, concept of frequency channels, Co-channel Interference Reduction Factor, desired C/I from a normal case in a Omni directional Antenna system, Cell splitting, consideration of the components of cellular system.
Interference: Introduction to Co-channel interference, real time co-channel interference, Co-channel measurement, design of Antenna system, Antenna parameters and their effects, diversity receiver, non-co-channel interference-different types.

Learning Outcomes:

At the end of the unit, the student will be able to:

- Gain knowledge on Co-channel Interference and cell splitting.(L1)
- Understand co-channel interference effects and reduction techniques.(L2)

UNIT III

Cell Coverage for Signal and Traffic: Signal reflections in flat and hilly terrain, effect of human made structures, phase difference between direct and reflected paths, constant standard deviation, straight line path loss slope, general formula for mobile propagation over water and flat open area, near and long distance propagation antenna height gain, form of a point to point model.

Learning Outcomes:

At the end of the unit, the student will be able to:

- Learn about the cell signal coverage and impact of surrounding environment. (L1)
- Understand different signal propagation methods and their effects. (L2)

UNIT IV

Cell Site and Mobile Antennas: Sum and difference patterns and their synthesis, Omni directional antennas, directional antennas for interference reduction, space diversity antennas, umbrella pattern antennas, minimum separation of cell site antennas, high gain antennas.
Frequency Management and Channel Assignment: Numbering and grouping, setup access and paging channels channel assignments to cell sites and mobile units, channel sharing and borrowing, sectorization, overlaid cells, non fixed channel assignment.

Learning Outcomes:

At the end of the unit, the student will be able to:

- Know about the consideration of antennas and pattern synthesis at cell site and mobile.(L1)
- Understand frequency management and channel assignment.(L2)

UNIT V

Handoff: Handoff, dropped calls and cell splitting, types of handoff, handoff invitation, delaying handoff, forced handoff, mobile assigned handoff. Intersystem handoff, cell splitting, micro cells, vehicle locating methods, dropped call rates and their evaluation.

System Evaluations: Performance evaluation, Signal evaluation, Measurement of average received level and level crossings, Spectrum efficiency evaluation.

Learning Outcomes:

At the end of the unit, the student will be able to:

- Appreciate the Handoff concept and types of handoff. (L1)
- Know about different types of digital cellular networks.(L1)

TEXT BOOKS:

1. W .C. Y. Lee, "Mobile cellular telecommunications", Tata Mc-Graw Hill, 2nd Edition, 2006.
2. Theodore. S. Rapport, "Wireless communications", Pearson Education, 2ndEdn., 2002.

REFERENCES:

1. Gordon L. Stuber, "Principles of Mobile communications", Springer International 2nd Edition, 2007.
2. Lee , "Wireless and Mobile Communications",McGraw Hills, 3rd Edition, 2006.
3. Jon W.Mark and WeihuaZhqung, "Wireless communications and Networking", PHI, 2005.
4. R.Blake, "Wireless communication Technology", Thompson Asia Pvt.Ltd., 2004.

Course Outcomes:

At the end of this course, the students will be able to

- Learn the basic elements of cellular and mobile communications.(L1)
- Understand Co-channel interference and cell splitting concepts in cellular communication.(L2)
- Gain an understanding of signal coverage and propagation losses.(L2)
- Explain about frequency management, channel assignment and antennas used at cell site and mobile.(L1)
- Know about types of digital cellular networks and hands off mechanism.(L1)

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

MANAGEMENT SCIENCE

(Common to all Branches)

L	T	P	C
3	0	0	3

Course Objectives:

- Understand the role of entrepreneurship in economic development.
- Identify the general characteristics of entrepreneurs.

UNIT – 1

INTRODUCTION TO MANAGEMENT

Concepts of Management - Nature, importance and Functions of Management - Taylor's Scientific Management Theory, Fayol's Principles of Management, Maslow's Theory of Human Needs, Douglas McGregor's Theory X and Theory Y, Leadership Styles, Social responsibilities of Management.

DESIGNING ORGANIZATIONAL STRUCTURES

Basic concepts related to Organisation - Departmentation and Decentralization, Types of mechanistic and organic structures of organization (Line organization, Line and staff organization, functional organization, Committee organization, matrix organization, team structure) their merits, demerits and suitability.

Learning Outcomes:

At the end of this unit, the student will be able to

• Understand the concept of management and organization.	L1
• Apply the concepts & principles of management in real life industry.	L2

UNIT – II

OPERATIONS MANAGEMENT:

Principles and Types of Plant Layout-Methods of production (Job, batch and Mass Production), Work Study. Statistical Quality Control: *c* chart, *p* chart, (simple Problems) Deming's contribution to quality.

MATERIALS MANAGEMENT: EOQ, Purchase Procedure and Stores Management.

Inventory — functions. Types, inventory classification techniques.

Marketing: Functions of Marketing, Marketing Mix, and Marketing Strategies based on Product Life Cycle, Channels of distribution.

Learning Outcomes:

At the end of this unit, the student will be able to

• Understand the core concepts of Management Science and Operations Management.	L1
• Evaluate Materials departments & Determine EOQ.	L2

UNIT – III

HUMAN RESOURCES MANAGEMENT (HRM):

Concepts of HRM, Personnel Management and Industrial Relations (PMIR), Basic functions of HR Manager: Manpower planning, Recruitment, Selection, Training and Development, Placement, Wage and Salary Administration, Promotion, Transfer, Separation, Performance Appraisal, Grievance Handling and Welfare Administration, Job Evaluation, Merit Rating and methods.

Learning Outcomes:

At the end of this unit, the student will be able to

• Understand the concepts of HRM in Recruitment, Selection, Training & Development.	L1

• Apply Managerial and operative Functions.	L2

UNIT – IV

STRATEGIC MANAGEMENT:

Vision, Mission, Goals, Objectives, Policy, Strategy, Programmes, Elements of Corporate Planning Process, Environmental Scanning, Value Chain Analysis, SWOT Analysis, Steps in Strategy Formulation and Implementation, Generic Strategy alternatives.

PROJECT MANAGEMENT (PERT/CPM):

Network Analysis, Programme Evaluation and Review Technique (PERT), Critical Path Method (CPM), Identifying critical path, Probability of Completing the project within given time, Project Cost Analysis, Project Crashing. (Simple problems).

Learning Outcomes:

At the end of this unit, the student will be able to

• Understand Mission, Objectives, Goals & strategies for an enterprise.	L1
• Evaluate PERT and CPM Techniques.	L2

UNIT – V

CONTEMPORARY MANAGEMENT PRACTICES:

Basic concepts of MIS, Materials Requirement Planning (MRP), Just-In-Time (JIT) System, Total Quality Management (TQM), Six sigma concept, Supply Chain Management, Enterprise Resource Planning (ERP), Performance Management, Business Process outsourcing (BPO), Business Process Re-engineering and Bench Marking, Balanced Score Card.

Learning Outcomes:

At the end of this unit, the student will be able to

• Analyze CRM, MRP, TQM.	L1
• Understand modern management techniques.	L2

Text Books:

1. **Management Science**,Aryasri: TMH, 2004.
2. **Management** ,Stoner, Freeman, Gilbert, 6th Ed, Pearson Education,New Delhi, 2004.

Reference Books:

1. **Marketing Mangement** , Kotler Philip & Keller Kevin Lane: 12/e, PHI,2005.
2. **Essentials of Management** ,Koontz & Weihrich:, 6/e, TMH, 2005.
3. **Management—Principles and Guidelines**, Thomas N.Duening & John M.Biztantra, 2003.
4. **Production and Operations Management**, Kanishka Bedi, , Oxford University Press, 2004.

Course Outcomes:

At the end of this Course the student will be able to

• Equipping engineers for a lifelong career addressing the critical technical and managerial needs of private and public organizations.	L1
• Exploring and developing analytic abilities, making better decisions, developing and executing strategies while also leading people who innovate.	L2
• Cultivating the technical skills as well as the behavioral challenges of running organizations and complex systems.	L3
• Emphasizing quantitative analytic skills and an entrepreneurial spirit	L4
• Have an introductory understanding of global entrepreneurship concepts.	L5

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

BUSINESS ENVIRONMENT
(Common to all Branches)

L	T	P	C
3	0	0	3

Course Objectives:

- To make the student understand about the business environment.
- To enable them in knowing the importance of fiscal and monitory policy.

UNIT – 1: BUSINESS ENVIRONMENT

Meaning – Various environments affecting business – Social Economic; Political and Legal; Culture; Competitive Demographic; Technological and International environments.

Learning Outcomes:

At the end of this unit, the student will be able to

• Understand the concept of Business environment.	**L1**
• Explain various types of business environment.	**L2**

UNIT – II: FISCAL & MONETARY POLICY

FISCAL POLICY - Public Revenues - Public Expenditure - Public debt - Development activities financed by public expenditure - Evaluation of recent fiscal policy of Government of India - Highlights of Budget - **MONETARY POLICY** - Demand and Supply of Money – RBI - Objectives of monetary and credit policy - Recent trends - Role of Finance Commission.

Learning Outcomes:

At the end of this unit, the student will be able to

• Understand the concept of public revenue and public Expenditure	**L1**
• Explain the functions of RBI and its role.	**L2**

UNIT – III: TRADE POLICY

INDIA'S TRADE POLICY - Magnitude and direction of Indian International Trade - Bilateral and Multilateral Trade Agreements - EXIM policy and role of EXIM bank - **BALANCE OF PAYMENTS** – Structure & Major components - Causes for Disequilibrium in Balance of Payments - Correction measures.

Learning Outcomes:

At the end of this unit, the student will be able to

• Understand the role of Indian international trade.	**L1**
• Analyze causes for Disequilibrium and correction measure.	**L2**

UNIT – IV: WORLD TRADE ORGANIZATION

WORLD TRADE ORGANIZATION - Nature and Scope - Organization and Structure - Role and functions of WTO in promoting world trade - Agreements in the Uruguay Round – TRIPS, TRIMS, and GATT - Disputes Settlement Mechanism - Dumping and Anti-dumping Measures.

Learning Outcomes:

At the end of this unit, the student will be able to

• Understand the Dispute Settlement Mechanism.	L1
• Compare and contrast the Dumping and Anti-dumping Measures.	L2

UNIT – V: MARKETS

MONEY MARKETS AND CAPITAL MARKETS - Features and components of Indian financial systems - Objectives, features and structure of money markets and capital markets - Reforms and recent development – SEBI - Stock Exchanges - Investor protection and role of SEBI.

Learning Outcomes:

At the end of this unit, the student will be able to

• Apply the knowledge in future investments.	L1
• Understand the role of SEBI in investor protection.	L2

Text Books:

1. Francis Cherunilam (2009), "International Business": Text and Cases, Prentice Hall of India.
2. K. Aswathappa, "Essentials of Business Environment": Texts and Cases & Exercises 13th Revised Edition.HPH2016.

Reference Books:

1. K. V. Sivayya, V. B. M Das (2009), Indian Industrial Economy, Sultan Chand Publishers, New Delhi, India.
2. Sundaram, Black (2009), International Business Environment Text and Cases,Prentice Hall of India, New Delhi, India.
3. Chari. S. N (2009), International Business, Wiley India.
4. E. Bhattacharya (2009), International Business, Excel Publications, New Delhi.

Course Outcomes:

At the end of this Course the student will be able to

• Apply the knowledge of Money markets in future investment.	L1
• Analyze India's Trade Policy.	L2
• Evaluate fiscal and monitory policy.	L3
• Develop a personal synthesis and approach for identifying business opportunities.	L4
• `Understand various types of business environment.	L5

B.Tech IV Year I Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

20AEC70- RF SYSTEMS DESIGN LAB

(SKILL ORIENTED COURSE – V)

L–T – P - C
1 – 0 – 2 – 2

Basic Concepts in RF Design: Introduce any RF design software and orient students with the tools of the laboratory. Practice the tool to use it for significant design.Introduction to RF Design, Time Variance and Nonlinearity, Effects of nonlinearity, Passive impedance transformation, Scattering parameters, impedance matching, L match, Pi match, T match, Passive IC Components- Resistors, capacitors Inductors, Schottky Diode, RF Switch.

RF Power Amplifiers and Filters: RF Power amplifier design examples, Gain equalizers, Voltage controlled oscillators, Phase locked loops, Linearized PLL models, PLL design examples, High frequency oscillators, Loop filters, lumped filter. LPF, HPF and BPF.

LNA, VCO and Mixers: General considerations, Problem of input matching, Low Noise Amplifiers design in various topologies, Gain Switching, Band Switching, Voltage Controlled Oscillators, Mixers-General considerations, Passive down conversion mixers, Active down conversion mixers, Up conversion mixers.

Microstrip transmission lines and discontinuities: S parameters of a Microstrip Transmission Line, Smith Chart, Analysis of Microstrip Transmission Line standing wave patterns at various frequencies, Different types of Transmission lines like CPW, Microstrip and Co-axial cable. Different types of Microstrip discontinuities like Bend, T, Via, Gap etc., Microstrip Ring Resonator.

Antennas and Microwave Integrated Circuits: Radiation Pattern, Gain, S Parameters, Return loss and VSWR. Design considerations of Microstrip Patch Antenna and Microstrip Array, Yagi Uda Antenna and Horn Antenna. Hybrid Microwave Integrated Circuits, Monolithic Microwave Integrated Circuits, Microwave Integrated Circuits: MMIC Amplifier.

Any twelve experiments are to be done:

1. Design and simulate Impedance matching circuits like L-Matching, Pi Matching and T-Matching.
2. Design and Simulate a Schottky Diode and RF Switch.
3. Design and simulate a RF BJT Amplifier and LNA.
4. Design and simulate a Power Amplifier and Gain Equalizer.
5. Analyse and measure the gain of a Power Amplifier and equalise its gain using an Equalizer.
6. Design and simulate a High Frequency Oscillator and Lumped Filter.
7. Measurement of insertion loss, -3dB Cut of frequency of LPF,HPF and BPF.
8. Design and Simulate a VCO and RF Mixer.
9. Measure the S parameters of a Micro strip Transmission Line and plot the normalised impedance on a smith chart
10. Analysis of Microstrip Transmission Line standing wave pattern at various frequencies.
11. Study of different types of Transmission lines like CPW, Microstrip and Co-axial and find/measure its Insertion Loss (S21 and S12)
12. Study of different types of Microstrip discontinuities like Bend, T, Via , Gap etc and find/measure its Insertion loss.
13. Determine the Bandwidth and Quality Factor of a Microstrip Ring Resonator.
14. Design and simulate the Radiation Pattern,gain, $S_{11}$and VSWRof a Microstrip Patch Antenna and Microstrip Array.
15. Design and simulate the Radiation Pattern, gain, $S_{11}$and VSWR of a Yagi Uda Antenna and Horn Antenna.
16. Design and Simulate a MMIC Amplifier.

Equipment Required

1. RF Circuit Design and Simulation Software
2. RF Training System
3. Antenna Measurement System with Antenna Design Software.

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

20AEC70- INDUSTRIAL IOT

(SKILL ORIENTED COURSE – V)

L–T – P - C
1 – 0 – 2 – 2

Course Objectives:

- Students will learn the new evolution in hardware, software, and data.
- Students acquire upcoming Industrial IoT: Roadmap to the Connected World Course offers important insights on overcoming the challenges and thrive in this exciting space.

Course Syllabus

MODULE 1: Introduction & Architecture

What is IIoT and connected world? the difference between IoT and IIoT, Architecture of IIoT, IOT node, Challenges of IIOT.

Practice

1. Introduction to Arduino, Introduction to raspberry Pi.

https://www.youtube.com/watch?v=AQdLQV6vhbk

MODULE 2: IIOT Components

Fundamentals of Control System, introductions, components, closed loop & open loop system. Introduction to Sensors (Description and Working principle): What is sensor? Types of sensors, working principle of basic Sensors -Ultrasonic Sensor, IR sensor, MQ2, Temperature and Humidity Sensors (DHT-11). Digital switch, Electro Mechanical switches.

Practice

1. Measurement of temperature & pressure values of the process using raspberry pi/node mcu.
2. Modules and Sensors Interfacing (IR sensor, Ultrasonic sensors, Soil moisture sensor) using Raspberry pi/node mcu.
3. Modules and Actuators Interfacing (Relay, Motor, Buzzer) using Raspberry pi/node mcu.

MODULE 3: Communication Technologies of IIoT

Communication Protocols: IEEE 802.15.4, ZigBee, Bluetooth, BLE, NFC, RFID Industry standards communication technology (LoRAWAN, MQTT), wireless network communication.

Practice

1. Demonstration of MQTT communication.
2. **Demonstration of LoRa communication.**

MODULE 4: Visualization and Data Types of IIoT

Connecting an Arduino/Raspberry pi to the Web: Introduction, setting up the Arduino/Raspberry pi development environment, Options for Internet connectivity with Arduino, Configuring your Arduino/Raspberry pi board for the IoT.

Practice

1. Visualization of diverse sensor data using dashboard (part of IoT's 'control panel')
2. Sending alert message to the user. ways to control and interact with your environment)

MODULE 5: Retrieving Data

Extraction from Web: Grabbing the content from a web page, Sending data on the web, Troubleshooting basic Arduino issues, Types of IoT interaction, Machine to Machine interaction (M2M).

Practice

1. Device control using mobile Apps or through Web pages.
2. Machine to Machine communication.

Projects (Any two):

IIoT based smart energy meter
Smart Agriculture system
Automation using controller via Bluetooth
Temperature controlled Fan/cooler using controller
Automatic streetlight
Smart Baggage Tracker

Textbooks:

1. The Internet of Things in the Industrial Sector, Mahmood, Zaigham (Ed.) (Springer Publication)
2. Industrial Internet of Things: Cyber manufacturing System, Sabina Jeschke, Christian Brecher, Houbing Song, Danda B. Rawat (Springer Publication)
3. Industrial IoT Challenges, Design Principles, Applications, and Security by Ismail Butun (editor)

Course Outcomes:

- Discover key IIoT concepts including identification, sensors, localization, wireless protocols, data storage and security
- Explore IoT technologies, architectures, standards, and regulation
- Realize the value created by collecting, communicating, coordinating, and leveraging the data from connected devices
- Examine technological developments that will likely shape the industrial landscape in the future
- Understand how to develop and implement own IoT technologies, solutions, and applications

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

B.Tech. VII-Sem (R20)

MATHEMATICAL MODELING

(Open Elective -III)

L	T	P	C
3	0	0	3

Course Objectives:

- To provide the basic knowledge to understand a Mathematical model.
- To formulate a Mathematical model related to a real world problems of engineering, biological science etc.

UNIT – 1: Mathematical Modeling & Mathematical modeling Through Ordinary differential equations of First Order :	**9 Hrs**

Mathematical Modeling : Need, Techniques, Classifications and Simple illustrations.

Mathematical modeling Through Ordinary differential equations of First Order :

Mathematical modeling Through differential equations; Linear growth and decay models; Non-Linear Growth and Decay models; Mathematical modeling in dynamics through ordinary differential equations of first order.

Learning Outcomes:

At the end of this unit, the student will be able to

• Learn various mathematical techniques in modeling a problem.	**L2**
• Learn modeling in dynamics through ordinary differential equations of first order.	**L3**

UNIT – II: Mathematical modeling Through System of Ordinary differential equations of First Order:

Mathematical modeling in population dynamics; Mathematical modeling of Epidemics through system of ordinary differential equations of first order; Compartment models through Systems of ordinary differential equations; Mathematical modeling in dynamics through systems of ordinary differential equations of first order.

Learning Outcomes:

At the end of this unit, the student will be able to

• Develop a modeling of Epidemics through system of ordinary differential equations of first order.	**L4**
• Analyze a modeling in dynamics through systems of ordinary differential equations of first order.	**L3**

UNIT – III: Mathematical modeling Through Ordinary differential equations of Second Order:

Mathematical modeling of Planetary motion ; Mathematical modeling of Circular motion and motion of satellites; Mathematical modeling through linear differential equations of second order.

Learning Outcomes:

At the end of this unit, the student will be able to

• Evaluate a mathematical modeling of Planetary motion.	**L5**
• Analyze a mathematical modeling of Circular motion and motion of satellites	**L3**

UNIT – IV: Mathematical modeling Through Difference equations :

Need for Mathematical modeling Through Difference equations and simple models; Basic theory of Linear difference equations with constant coefficients; Mathematical modeling Through Difference equations in population dynamics and genetics; Mathematical modeling Through Difference equations in

Meeny

Probability theory.	
Learning Outcomes:	
At the end of this unit, the student will be able to	
• Analyze mathematical modeling through difference equations in population dynamics and genetics.	**L4**
• Analyze mathematical modeling through difference equations in probability theory.	**L4**
UNIT – V: Mathematical modeling Through Functional, Integral, Delay- Differential and Differential-Difference Equations :	
Mathematical modeling Through Functional equations; Mathematical modeling Through Integral equations; Mathematical modeling Through Delay- Differential and Differential-Difference Equations.	
Learning Outcomes:	
At the end of this unit, the student will be able to	
• Analyze a mathematical modeling through functional equations and integral equations.	**L4**
• Analyze a mathematical modeling Through Delay- Differential and Differential-Difference Equations	**L4**
Text Books:	
1. J. N. Kapoor. Mathematical Modeling , NEW AGE INTERNATIONAL PUBLISHERS.	
Reference Books:	
1. A. C. Fowler. Mathematical Models in Applied Sciences, Cambridge University Press.	
Course Outcomes:	
At the end of this Course the student will be able to	
• Understand the basic concepts in mathematical modeling.	**L1**
• Have better insight of the real word problems through mathematical modeling .	**L2**
• Apply various concepts of mathematics in modeling.	**L3**
• Analyze the real word problems through the techniques of modeling.	**L4**
• Evaluate the real word problems through mathematical modeling.	**L5**

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JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS)::PULIVENDULA
DEPARTMENT OF PHYSICS
IV B.TECH – I SEMESTER-R20 (Open elective-Interdisciplinary) –OE-ID.1(THEORY

SENSORS AND ACTUATORS FOR ENGINEERING APPLICATIONS

(Common to all branches)

L	T	P	C
3	0	0	3

Course Objectives:

1. To understand basics of sensors, actuators and their operating principles.
2. To educate the students on different types of microfabrication techniques for designing and developing sensors.
3. To explain working of various types of electrochemical sensors and actuators.
4. To provide an understanding on characteristic parameters to evaluate sensor performance.

UNIT – 1: Introduction to Sensors and Actuators — 9 Hrs

Content of the Unit – I

Sensors: Types of sensors: temperature, pressure, strain, active and passive sensors, General characteristics of sensors (Principles only), Materials used and their fabrication process: Deposition: Chemical Vapor Deposition, Pattern: photolithography and Etching: Dry and Wet Etching.

Learning Outcomes:

At the end of this unit, the student will be able to

• **Classify** different types of Sensors and their characteristics	L2
• **Explain** about different fabrication process of Sensors	L1
• **Illustrate** Dry and wet etching	L2

UNIT – II: Temperature and Mechanical Sensors — 9 Hrs

Temperature Sensors: Types of temperature sensors and their basic principle of working: Thermo-resistive sensors: Thermistors, Resistance temperature sensors, Silicon resistive sensors, Thermo-electric sensors: Thermocouples, PN junction temperature sensors

Mechanical Sensors: Types of Mechanical sensors and their basic principle of working: Force sensors,strain gauges, Pressure sensors: semiconductor, piezoresistive, capacitive, Variable reluctance pressure (VRP) sensors.

Learning Outcomes:

At the end of this unit, the student will be able to

• **Summarize** various types of Temperature sensors	L2
• **Explain** basic working principle of different types mechanical sensors	L1
• **Summarize** various types of Mechanical sensors	L2
• **Explain** the working principle of different types mechanical sensors	L1

UNIT – III: Optical, Acoustic and Chemical Sensors — 9 Hrs

Content of the Unit – III

Optical Sensors: Basic principle and working of: Photodiodes, Phototransistors and Photo-resistors based sensors, Photomultipliers, Infrared sensors: thermal, PIR, thermopiles

Acoustic Sensors: Principle and working of Ultrasonic sensors, Piezo-electric resonators, Microphones.

Chemical Sensors: Principle and working of Electro-chemical, Thermo-chemical, Gas, pH, Humidity and moisture sensors.

Learning Outcomes:	
At the end of this unit, the student will be able to	
• **Explain** the working and principle of various optical sensors	L1
• **Explain** the working principle of different Acoustic sensors	L1
• **Explain** the working and principle of various chemical sensors	L1

UNIT – IV: Magnetic, Electromagnetic and Radiation Sensors	**9 Hrs**
Inductive sensors (LVDT, RVDT, and Proximity), Hall Effect sensors, Magneto-resistive sensors, Magneto-strictive sensors, **Radiation Sensors**: Principle and working of Ionization detectors, Scintillation detectors, Geiger-Mueller counters, Semiconductor radiation detectors and Microwave sensors (resonant, reflection, transmission)	
Learning Outcomes:	
At the end of this unit, the student will be able to	
• **Explain** the working principle of different magnetic and electromagnetic sensors	L1
• **Explain** the working principle of different radiation sensors	L1
• **Identifies** the applications Electronic sensors in various fields	L1
• **Identify** the various optical, solid state system components	L1

UNIT – V: Actuators Types, Principle, Magnetic, Electromagnetic actuators	**9 Hrs**
Introduction, Functional diagram of actuators, Types of actuators and their basic principle of working: Hydraulic, Pneumatic, Mechanical, Electrical, Magnetic, Electromagnetic, piezo-electric and piezo-resistive actuators, Simple applications of Actuators. Motors as actuators (linear, rotational, stepping motors),Magneto-strictive actuators, Voice coil actuators (speakers and speaker-like actuators).	
Learning Outcomes:	
At the end of this unit, the student will be able to	
• **Illustrates** the different types of Actuators	L2
• **Explains the** basic principle of working of Actuators	L1
• **Identifies** the applications of Actuators sensors	L1

Text Books:
1. Sensors and Actuators – Clarence W. de Silva, CRC Press, 2nd Edition, 2015
2. Sensors and Actuators, D.A.Hall and C.E.Millar, CRC Press, 1999

Reference Books:
1. Sensors and Transducers- D.Patranabhis, Prentice Hall of India (Pvt) Ltd. 2003
2. Measurement, Instrumentation, and Sensors Handbook-John G.Webster, CRC press 1999
3. Sensors – A Comprehensive Sensors- Henry Bolte, John Wiley.
4. Handbook of modern sensors, Springer, Stefan Johann Rupitsch.
5. Principles of Industrial Instrumentation By D. Patranabhis

Course Outcomes:	
At the end of this Course the student will be able to	
➢ to identify the needs of sensors and actuators	L1
➢ to understand working principles of various sensors and actuators	L2
➢ to identify different type of sensors and actuators used in real life applications	L1
➢ to explore common methods for converting a physical parameter into an electrical quantity	L3
➢ to summaries use of sensors and actuators for different applications	L2

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA				
B.Tech – IV-I-Sem	L	T	P	C
	3	0	0	3

Chemistry of Nanomaterials and applications (OE.3)
(common to all branches)

Course Objectives:

- To understand synthetic principles of Nanomaterials by various methods
- Characterize the synthetic nanomaterials by various instrumental methods
- To enumerate the applications of nanomaterials in engineering
- Understand the use of alternatives assessments that combine chemical, environmental health, regulatory, and business considerations to develop safer products.

UNIT-I: **Introduction to nanoscience**	7 Hrs

Introduction,importance of nanomaterials, nanoscience in nature, classification of nanostructured materials, properties and scope of nanoscience and applicationsof nanotechnology.

Learning Outcomes:

At the end of this unit, the student will be able to:

- . Classify the nanostructure materials(L2)
- Describe scope of nano science and technology(L2)
- Explain different synthetic methods of nano materials(L2)
- Identify the synthetic methods of nanomaterial which is suitable for preparation of particular material(L3)

UNIT-II: **Synthesis of nanomaterials**	8Hrs

Bottom-Up approach:- Sol-gel synthesis, microemulsions or reverse micelles, co-precipitation method, solvothermal synthesis, hydrothermal synthesis.
Top-Down approach:- Arc discharge Plasma arc method, aerosol synthesis, ion sputtering, laser pyrolysis,laser ablation, chemical vapour deposition method, electrodeposition method, and high energy ball milling

Learning Outcomes:

At the end of this unit, the student will be able to:

- Describe the top down approach(L2)
- Explain aerosol synthesis and plasma arc technique(L2)
- Differentiate chemical vapour deposition method and electrodeposition method(L2)
- Discuss about high energy ball milling(L3)

UNIT-III: Characterization of nanomaterials	7 Hrs

Techniques for characterization:Dynamic light scattering for particle size determination, Diffraction technique, electron microscopy techniques, BET method for surface area analysis.

Learning Outcomes:

After completing the course, the student will be able to:

- Discuss different technique for characterization of nanomaterial(L3)

- Explain electron microscopy techniques for characterization of nanomaterial(L3)
- Describe BET method for surface area analysis (L2)
- Apply different spectroscopic techniques for characterization(L3)

UNIT-IV: Structural studies of nanomaterials	8 Hrs

Properties of nanomaterials: fullerenes, carbon nanotubes, core-shell nanoparticles. Nano-crystalline materials, magnetic nanoparticles and important properties in relation to nano-magnetic materials, thermoelectric materials, non-linear optical materials, liquid crystals

Learning Outcomes:

After completing the course, the student will be able to:

- Explain synthesis and properties and applications of nanaomaterials(L2)
- Discuss about fullerenes and carbon nanotubes(L3)
- Differentiate nanomagnetic materials and thermoelectric materials(L2)
- Describe liquid crystals(L2)

UNIT-V: Applications of Nanomaterials	7Hrs

Engineering, medicine. aerospace applications of nanomaterials. Technologies based on nano materials.

Learning Outcomes:

After completing the course, the student will be able to:

- Illustrate applications of nanaomaterials(L2)
- Discuss the magnetic applications of nanomaterials(L3)
- List the applications of non-linear optical materials(L1)
- Describe the applications fullerenes, carbon nanotubes(L2)

Text Books:

1. NANO: The Essentials: T Pradeep, MaGraw-Hill, 2007
2. Textbook of Nanoscience and nanotechnology: B S Murty, P Shankar, BaldevRai, BB Rath and James Murday, Univ. Press, 2012

Reference Books:

1. Ludovico Cademrtiri and Geoffrey A. Ozin& Geoffrey A. Ozin, Concepts of Nanochemistry; Wiley-VCH, 2011.
2. Guozhong Cao, Nanostructures & Nanomaterials; Synthesis, Properties & Applications:, Imperial College Press, 2007
3. C. N. R. Rao, Achim Muller, K.Cheetham, Nanomaterials Chemistry, , Wiley-VCH, 2007

Course Outcomes:

At the end of this Course the student will be able to

- Understand the state of art synthesis of nano materials(L1)
- Characterize nano materials using ion beam, scanning probe methodologies, position sensitive atom probe and spectroscopic ellipsometry(L2)
- Analyze nanoscale structure in metals, polymers and ceramics(L3)
- Analyze structure-property relationship in coarser scale structures(L3)

- Understand structures of carbon nano tubes(L1)

B.Tech IV Year I Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS)::PULIVENDULA

20ACE75A- DISASTER MANAGEMENT AND MITIGATION

(OPEN ELECTIVE-III)

L	T	P	C
3	0	0	3

Course Objectives:

- The objectives of this are to give the basic knowledge of Environmental Hazards and disasters. The syllabus includes the basics of Endogenous and Exogenous hazard's and gives a suitable picture on the different types ofhazardas.

UNIT-I:

Environmental Hazards & Disasters: Meaning of Environmental hazards, Environmental Disasters and Environmental stress. Concept of Environmental Hazards, Environmental stress & Environmental Disasters. Different approaches & relation with human Ecology - Landscape Approach - Ecosystem Approach - Perception approach - Human ecology & its application in geographical researches.

UNIT-II:

Classification of hazards & Disasters: Natural hazards and Disasters - Man Made hazards & Disasters - Planetary Hazards/ Disasters - Extra Planetary Hazards/ disasters - Planetary Hazards- Endogenous Hazards - Exogenous Hazards

UNIT-III

Endogenous Hazards - Volcanic Eruption – Earthquakes – Landslides - Volcanic Hazards/ Disasters - Causes and distribution of Volcanoes - Hazardous effects of volcanic eruptions - Environmental impacts of volcanic eruptions - Earthquake Hazards/ disasters - Causes of Earthquakes - Distribution of earthquakes - Hazardous effects of - earthquakes - Earthquake Hazards in India - - Human adjustment, perception & mitigation of earthquake.

UNIT-IV:

Exogenous hazards/ disasters - Infrequent events- Cumulative atmospheric hazards/ disasters Infrequent events: Cyclones – Lightning – Hailstorms Cyclones: Tropical cyclones & Local storms - Destruction by tropical cyclones & local storms (causes, distribution human adjustment, perception & mitigation)Cumulative atmospheric hazards/ disasters : - Floods- Droughts- Cold waves- Heat waves. Floods:- Causes of floods- Flood hazards India- Flood control measures (Human adjustment, perception & mitigation).Droughts:- Impacts of droughts- Drought hazards in India- Drought control measures- Extra Palnetary Hazards/ Disasters- Man induced Hazards /Disasters- Physical hazards/ Disasters-Soil Erosion Soil Erosion:-- Mechanics & forms of Soil Erosion- Factors & causes of Soil Erosion- Conservation measures of Soil Erosion. Chemical hazards/ disasters:-- Release of toxic chemicals, nuclear explosion- Sedimentation processes. Sedimentation processes:- Global Sedimentation problems- Regional Sedimentation problems- Sedimentation & Environmental problems- Corrective measures of Erosion & Sedimentation-Biological hazards/ disasters:- Population Explosion.

UNIT-V:

Emerging approaches in Disaster Management- Three Stages

1. Pre- disaster stage(preparedness)-HVRA Atlas
2. Emergency Stage
3. Post Disaster stage-Rehabilitation

Text Books:

1. Disaster Management by Rajib Shah, Universities Press, India,2003
2. Disaster Mitigation: Experiences And Reflections by PardeepSahni
3. Natural Hazards & Disasters by Donald Hyndman & David Hyndman – Cengage Learning
4. National Disaster Management Authority-Guidelines

Reference Books:

1. Kates,B.I& White, G.F The Environment as Hazards, oxford, New York, 1978
2. R.B. Singh (Ed) Disaster Management, Rawat Publication, New Delhi, 2000
3. H.K. Gupta (Ed) Disaster Management, Universiters Press, India, 2003
4. R.B. Singh, Space Technology for Disaster Mitigation in India (INCED), University of Tokyo,1994
5. Dr.Satender,Disaster Management in Hills, Concept Publishing Co., New Delhi, 2003

Course Outcomes:

At the end of this Course the student will be able to

- Understand the nature, cause and effects of disasters
- Comprehend the importance of Disaster Management and the need of awareness
- Acquire knowledge on disaster preparedness, recovery remedial measures and personal precautions

B.Tech IV Year I Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

IOT APPLICATIONS IN ELECTRICAL ENGINEERING

(Open Elective-III)

L	T	P	C
3	0	0	3

Course Objectives: The objectives of the course are to make the students learn about

- To learn about a few applications of Internet of Things
- To distinguish between motion less and motion detectors as IOT applications
- To know about Micro Electro Mechanical Systems (MEMS) fundamentals in design and fabrication process
- To understand about applications of IOT in smart grid
- To introduce the new concept of Internet of Energy for various applications

UNIT – I: SENSORS **10 Hrs**

Definitions, Terminology, Classification, Temperature sensors, Thermoresistive, Resistance, temperature detectors, Silicon resistive thermistors, Semiconductor, Piezoelectric, Humidity and moisture sensors. Capacitive, Electrical conductivity, Thermal conductivity, time domain reflectometer, Pressure and Force sensors: Piezoresistive, Capacitive, force, strain and tactile sensors, Strain gauge, Piezoelectric

Learning Outcomes:

At the end of this unit, the student will be able to

- To know about basic principles of sensors and their classification L1
- To learn about various motion less sensors L2

UNIT – II: Occupancy and Motion detectors **10 Hrs**

Capacitive occupancy, Inductive and magnetic, potentiometric - Position, displacement and level sensors, Potentiometric, Capacitive, Inductive, magnetic velocity and acceleration sensors, capacitive, Piezoresistive, piezoelectric cables, Flow sensors, Electromagnetic, Acoustic sensors - Resistive microphones, Piezoelectric, Photo resistors

Learning Outcomes:

At the end of this unit, the student will be able to

- To know about Capacitive occupancy L1
- To understand about Motion detectors L2

UNIT – III: MEMS **10 Hrs**

Basic concepts of MEMS design, Beam/diaphragm mechanics, electrostatic actuation and fabrication, Process design of MEMS based sensors and actuators, Touch sensor, Pressure sensor, RF MEMS switches, Electric and Magnetic field sensors

Learning Outcomes:

At the end of this unit, the student will be able to

- To understand about the basic concept of MEMS L1
- To know about electrostatic actuation L2

UNIT – IV: IOT FOR SMART GRID **10 Hrs**

Driving factors, Generation level, Transmission level, Distribution level, Applications, Metering and monitoring applications, Standardization and interoperability, Smart home

Learning Outcomes:

At the end of this unit, the student will be able to

- To get exposure fundamental applications of IoT to Smart grid L1
- To learn about driving factors of IoT in Generation level L2

UNIT – V: IOE - Internet of Energy **10 Hrs**

Concept of Internet of Energy, Evaluation of IoE concept, Vision and motivation of IOE, Architecture, Energy routines, information sensing and processing issues, Energy internet as smart grid.

Learning Outcomes:

At the end of this unit, the student will be able to

- To get exposed the new concept of internet of energy **L1**
- To learn about architecture of IOE **L2**

Text Books:

1. Jon S. Wilson, Sensor Technology Hand book, Newnes Publisher, 2004
2. Tai Ran Hsu, MEMS and Microsystems: Design and manufacture, 1st Edition, Mc Grawhill Education, 2017
3. ErsanKabalci and YasinKabalci, From Smart grid to Internet of Energy, 1st Edition, Academic Press, 2019

Reference Books:

1. Raj Kumar Buyya and Amir VahidDastjerdi, Internet of Things: Principles and Paradigms, Kindle Edition, Morgan Kaufmann Publisher, 2016
2. Yen Kheng Tan and Mark Wong, Energy Harvesting Systems for IoT Applications: Generation, Storage and Power Management, 1st Edition, CRC Press, 2019
3. RMD SundaramShriram, K. Vasudevan and Abhishek S. Nagarajan, Internet of Things, Wiley, 2019

Course Outcomes:

At the end of this Course the student will be able to

- To get exposed to recent trends in few applications of IoT in Electrical Engineering **L1**
- To understand about usage of various types of motionless sensors **L2**
- To understand about usage of various types of motion detectors **L3**
- To get exposed to various applications of IoT in smart grid **L4**
- To get exposed to future working environment with Energy internet **L5**

B.Tech IV Year I Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

20AME75a-INTRODUCTION TO COMPOSITE MATERIALS

(Open Elective-III)

L	T	P	C
3	0	0	3

Course Objectives: The objectives of the course are to make the students learn about
- Introduce composite materials and their applications.
- Build proper background for stress analysis in the design of composite structures.
- Familiarize various properties of composite materials.
- Focus on biodegradable composites.

UNIT – I: Introduction to composites: **10 Hrs**

Fundamentals of composites – Definition – classification– based on Matrix – based on structure – Advantages and applications of composites - Reinforcement – whiskers – glass fiber – carbon fiber - Aramid fiber – ceramic fiber – Properties and applications.

Learning Outcomes:

At the end of this unit, the student will be able to
- Explain the fundamentals of composites. **L2**
- Classify the composites based on matrix and structure. **L2**
- Identify the practical applications of composites. **L3**
- Summarize the properties and advantages of reinforcement materials. **L2**

UNIT – II: Polymer matrix composites **8 Hrs**

Polymers - Polymer matrix materials – PMC processes - hand layup processes – spray up processes – resin transfer moulding – Pultrusion – Filament winding – Auto clave - Injection moulding – sheet moulding compound – properties and applications of PMCs.

Learning Outcomes:

At the end of this unit, the student will be able to
- Explain the properties of polymer matrix composites. **L2**
- Identify the polymer matrix composites. **L3**
- Explain various process used in making the polymer matrix composites. **L2**
- Discuss the auto clave based methods. **L6**

UNIT – III: Metal matrix composites: **8 Hrs**

Metals - types of metal matrix composites – Metallic Matrices. Processing of MMC – Liquid state processes – solid state processes – In-situ processes. Properties and applications of MMCs.

Learning Outcomes:

At the end of this unit, the student will be able to
- Outline the various types of metal matrix composite. **L2**
- Explain liquid state processes and solid state processes in MMCs preparation. **L2**
- Demonstrate In-situ processes. **L2**
- Identify the properties and applications of MMCs. **L2**

UNIT – IV: Ceramic matrix composites: **8 Hrs**

Ceramic matrix materials – properties – processing of CMCs –Sintering - Hot pressing – Infiltration – Lanxide process – In-situ chemical reaction techniques – solgel polymer pyrolsis –SHS - Cold isostatic pressing (CIPing) – Hot isostatic pressing (HIPing). Properties and Applications of CCMs.

Learning Outcomes:

At the end of this unit, the student will be able to
- Summarize the various types of ceramic matrix materials. **L2**
- Explain the sintering, hot pressing, infiltration and lanxide process. **L3**
- Contrast between cold and hot isostatic pressing. **L2**
- Examine the properties and applications of CCMs. **L2**

UNIT – V: Advances & Applications of composites: **8 Hrs**

Advantages and Limitations of carbon matrix composites – chemical vapour deposition of carbon on carbon fibre perform. Properties and applications of Carbon-carbon composites. Composites for aerospace applications. Bio degradability - introduction to bio composites, classification, processing and, applications of bio composites - Mechanical, Biomedical, automobile Engineering.

Learning Outcomes:

At the end of this unit, the student will be able to

- Explain the advantages and disadvantages of carbon matrix. **L2**
- Identify composites for aerospace applications. **L3**
- Apply chemical vapour deposition of carbon on carbon fibre perform. **L3**
- Select the carbon - carbon composites. **L1**
- Classify various bio- degradable composites. **L3**

Text Books:

1. Chawla K.K, Composite materials, 2/e, Springer – Verlag, 1998.
2. Mathews F.L. and Rawlings R.D., Chapman and Hall, Composite Materials: Engineering and Science, 1/e, England, 1994.

Reference Books:

1. H K Shivanand, B V Babu Kiran, Composite Materials, ASIAN BOOKS, 2011.
2. A.B. Strong , Fundamentals of Composite Manufacturing, SME Publications, 1989.
3. S.C. Sharma, Composite materials, Narosa Publications, 2000.
4. Maureen Mitton, Hand Book of Bio plastics & Bio composites for Engineering applications, John Wiley publications, 2011.

Course Outcomes:

At the end of this Course the student will be able to

- Identify the practical applications of composites. **L3**
- Identify the polymer matrix composites. **L3**
- Classify of bio- degradable composites. **L2**
- Outline the various types of ceramic matrix materials. **L2**

Online Learning Resources:

- https://nptel.ac.in/courses/112104229
- https://nptel.ac.in/courses/112104168
- https://nptel.ac.in/courses/101104010
- https://nptel.ac.in/courses/105108124
- https://nptel.ac.in/courses/112104221

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B.Tech IV Year I Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

20AME75b-CUSTOMER RELATIONSHIP MANAGEMENT

(Open Elective-III)

L	T	P	C
3	0	0	3

Course Objectives: The objectives of the course are to make the students learn about

- Introduce basic concepts and principles of customer relationship management (CRM).
- Familiarize with appreciate the role and changing face of CRM as an IT enabled function.
- Describe concept of managing and sharing customer data.
- Explain the principles of CRM links in e-Business.
- Expose the students on Enterprise resource planning (ERP),supply chain management (SCM) and Supplier relationship management (SRM).

UNIT – I: CRM concepts **10 Hrs**

CRM concepts - Acquiring customers, - Customer loyalty and optimizing customer relationships - CRM defined - success factors, the three levels of Service/ Sales Profiling - Service Level Agreements (SLAs), creating and managing effective SLAs.

Learning Outcomes:

At the end of this unit, the student will be able to

- Explain the concepts of customer relationship management. **L2**
- Define customer relationship management (CRM). **L1**
- Illustrate the service level agreements (SLAs). **L2**

UNIT – II: CRM in Marketing : **8 Hrs**

CRM in Marketing - One-to-one Relationship Marketing - Cross Selling & Up Selling - Customer Retention, Behaviour Prediction - Customer Profitability & Value Modeling - Channel Optimization - Event-based marketing. - CRM and Customer Service - The Call Centre, Call Scripting - Customer Satisfaction Measurement.

Learning Outcomes:

At the end of this unit, the student will be able to

- Explain the concept of one-to-one relationship marketing. **L2**
- Develop the skills related to predict the behaviour and retention of the customer. **L6**
- Discus about customer profitability and value modeling. **L6**
- Illustrate the various methods for CRM and customer service. **L2**

UNIT – III: Sales Force Automation **8 Hrs**

Sales Force Automation - Sales Process, Activity, Contact- Lead and Knowledge Management - Field Force Automation. - CRM links in e-Business - E-Commerce and Customer Relationships on the Internet - Enterprise Resource Planning (ERP), - Supply Chain Management (SCM), - Supplier Relationship Management (SRM), - Partner relationship Management (PRM). - Case studies.

Learning Outcomes:

At the end of this unit, the student will be able to

- Explain the concept of CRM links in e-Business. **L1**
- Discus E-commerce and customer relationship on the internet. **L6**
- Describe Enterprise resource planning (ERP), Supply chain management (SCM). **L2**
- Explain terms supplier relationship management and partner relationship management. **L2**

UNIT – IV: Analytical CRM **8 Hrs**

Analytical CRM - Managing and sharing customer data - Customer information databases - Ethics and legalities of data use - Data Warehousing and Data Mining concepts - Data analysis - Market Basket Analysis (MBA), Click stream Analysis, Personalization and Collaborative Filtering.

Learning Outcomes:

At the end of this unit, the student will be able to

- Explain how to manage and sharing the customer data. **L2**

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- List the various ethics and legalities of customer database use. **L1**
- Describe various data warehousing and data mining concepts **L3**
- Discus about market basket analysis (MBA). **L6**

UNIT – V: CRM Implementation **8 Hrs**

CRM Implementation - Defining success factors - Preparing a business plan requirements, justification and processes. - Choosing CRM tools - Defining functionalities - Homegrown versus out-sourced approaches - Managing customer relationships - conflict, complacency, Resetting the CRM strategy. Selling CRM internally - CRM development Team - Scoping and prioritizing - Development and delivery - Measurement.

Learning Outcomes:

At the end of this unit, the student will be able to

- Define success factors for implementing the customer relationship management. **L1**
- Define functionalities of CRM. **L1**
- Explain the functions of CRM development team. **L2**
- Compare Home grown and out-sourced approaches. **L2**

Text Books:

1. Alok Kumar Rai, Customer Relationship Management Concept & Cases, Prentice Hall Of India Private Limted, New Delhi. 2011.
2. S. Shanmugasundaram, Customer Relationship Management, Prentice Hall Of India Private Limted, New Delhi, 2008.

Reference Books:

1. Kaushik Mukherjee, Customer Relationship Management, Prentice Hall Of India Private Limted, New Delhi, 2008.
2. Jagdish Seth, Et Al, Customer Relationship Management.
3. V. Kumar & Werner J., Customer Relationship Management, Willey India, 2008.

Course Outcomes:

At the end of this Course the student will be able to

- Summarizes the how CRM works in industries. **L2**
- Discuss about market basket analysis (MBA). **L6**
- Develop the skills related to predict the behaviour and retention of the customer. **L6**
- Explain the concepts of customer relationship management. **L2**

Online Learning Resources:

- https://nptel.ac.in/courses/110105145
- https://onlinecourses.swayam2.ac.in/imb19_mg10/preview
- https://www.classcentral.com/course/swayam-customer-relationship-management-13977
- https://www.edx.org/course/customer-relationship-management

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JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

20AEC75a- FUNDAMENTALSTO IMAGE PROCESSING

(Open Elective-III)

L – T – P - C
3 – 0 – 0 – 3

Course Objectives:

- To learn the fundamentals of Image Processing and learn the different types of image transforms.
- To study different types of filtering techniques for image enhancement.
- To understand various types of image segmentation and thresholding techniques.
- To gain knowledge on wavelets and multi resolution image processing techniques.
- To comprehend various types of image compression and colour image processing methods.

UNIT I

Digital Image Fundamentals: Fundamental steps of digital image processing, Components of Digital Image processing, image sampling and quantization, basic relationships between pixels – neighbourhood, adjacency, connectivity, distance measures. Applications of Digital Image Processing.

Image Transforms: Fourier Transform and its properties in one dimensional and Two dimensional, Discrete Fourier Transform, Discrete Cosine Transform, Discrete Sine transform, Walsh transform, Hadamard transform, Slant transform, KL Transforms and its properties.

Learning Outcomes:

At the end of the unit, the student will be able to:

- Understand the fundamentals of digital image processing.(L2)
- Analyze the image transforms in one and two dimensions.(L4)

UNIT II

Image Enhancements and Filtering: Gray level transformations, Histogram processing, histogram equalization, Enhancement of Frequency domain, Homomorphic filtering, Filtering in the frequency domain. Image Restoration: A Model of the Image Degradation \ Restoration Process, Noise Models, Inverse filtering, Minimum Mean Square Error (Weiner) Filtering, Constrained least squares filtering.

Learning Outcomes:

At the end of the unit, the student will be able to:

- Analyze the filters in spatial and frequency domains. (L4)
- Understand the image restoration model and various types of noises in image restoration.(L2)

UNIT III

Image Segmentation: Detection of Discontinuities: Point detection, Line detection, Edge detection, Edge linking and boundary detection, Thresholding, Region based segmentation.

Learning Outcomes:

At the end of the unit, the student will be able to:

- Learn the concept of image segmentation.(L1)
- Analyze various types of thresholding techniques.(L4)

UNIT IV

Wavelets and Multi-resolution image processing: Back ground, Image Pyramids, Sub band coding, The HaarTransform.Multi resolution Expansions: Series Expansions, Scaling Functions, Wavelet Functions, Wavelet Transform in One dimension: The wavelet series expansions, The Discrete wavelet transform, The Continuous Wavelet Transform, The Fast wavelet Transform, Wavelet transform in two dimensions, Wavelet Packets.

Learning Outcomes:

At the end of the unit, the student will be able to:

- Understand the wavelets in one dimension and two dimensions.(L2)
- Explain the multi-resolution expansions and fast wavelet transform.(L1)

UNIT V:

Image Compression: Redundancy, coding, inter-pixel and psycho-visual; Loss less compression – Huffmann coding, predictive coding; Lossy Image compression- predictive and transform coding; Image compression standards.

Color Image Processing: Color Fundamentals. Color models–RGB, CMY, HSI; Pseudo color Image Processing, Basics of Full color Image Processing.

Learning Outcomes:

At the end of the unit, the student will be able to:

- Understand the need for image compression and its types.(L2)
- Learn the color image processing and various types of color models. (L1)

TEXT BOOKS:

1. R.C. Gonzalez and R.E. Woods, "Digital Image Processing", Second Edition, Pearson Education, 2008.
2. Anil Kumar Jain, "Fundamentals of Digital Image Processing", Prentice Hall of India, 2nd edition 2004.

REFERENCES:

1. Rafael C. Gonzalez, Richard E woods and Steven L. Eddins, "Digital Image processing using MATLAB", Tata McGraw Hill, 2010.
2. S Jayaraman, S Esakkirajan and T Veerakumar, "Digital Image processing", Tata McGraw Hill.
3. William K. Pratt, "Digital Image Processing", John Wiley, 3rd Edition, 2004.

Course outcomes:

At the end of this course, the students will be able to

- Understand the fundamentals of Image Processing and apply different types of image transforms. (L2)
- Correlate different types of filtering techniques for image enhancement. (L4)
- Understand various types of image segmentation and thresholding techniques.(L2)
- Gain knowledge on wavelets and multi resolution image processing techniques.(L1)
- Summarize different types of image compression and colour image processing methods.(L2)

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

20AEC75b- BASICS OF VLSI DESIGN

(Open Elective-III)

L – T – P - C
3 – 0 – 0 – 3

Course Objectives:

- To give exposure to different steps involved in the fabrication of ICs and electrical properties of MOS devices.
- To know the design rules in drawing the layout of any logic circuit.
- To design different types of logic gates using CMOS inverter and analyze their transfer characteristics.
- To learn the concepts scaling and designing building blocks of data path of any system using gates.
- Understand the design and operation of basic programmable logic devices.

UNIT I

MOS Technology: Introduction to IC Technology. The IC Era, MOS and related VLSI Technology, Basic MOS Transistors, Enhancement and Depletion modes of transistor action, nMOS and CMOS Fabrication processes.

Basic Electrical Properties of MOS Circuits: I_{ds} versus V_{ds} Relationships, Aspects of MOS transistor Threshold Voltage, MOS transistor Transconductance and Output Conductance, nMOS Inverter, Determination of Pull-up to Pull-down Ratio for nMOS inverter driven by another nMOS inverter, CMOS Inverter.

Learning Outcomes:

At the end of the unit, the student will be able to:

- Understand different steps involved in the fabrication of ICs and electrical properties of MOSdevices.(L2).
- Analyze the operation of NMOS, CMOS and BiCMOS inverters.(L4)

UNIT II

MOS Circuit Design Processes: MOS Layers, Stick Diagrams, Design Rules and Layout, General observations on the Design rules, 2μm Double Metal, Double Poly CMOS rules, Layout Diagrams-A Brief Introduction, Symbolic Diagrams-Translation to Mask Form.

Learning Outcomes:

At the end of the unit, the student will be able to:

- Know the VLSI design flow and stick diagrams.(L1)
- Understand the design rules in drawing the layout of any logic circuit.(L2)

UNIT III

Basic Circuit Concepts: Sheet Resistance. Sheet Resistance concept applied to MOS transistors and Inverters, Area Capacitance of Layers, standard unit of capacitance, area Capacitance calculations, the Delay Unit, Inverter Delays, Driving large capacitive loads, Propagation Delays, Wiring Capacitances.

Learning Outcomes:

At the end of the unit, the student will be able to:

- Understand different types of logics in gate level design.(L2)
- Learn and compare different performance parameters in gate level design.(L1)

UNIT IV

Scaling of MOS Circuits: Scaling models and scaling factors, Scaling factors for device parameters, Limitations of scaling.

Sub System Design and Layout: Switch logic, Gate logic, Examples of Structured Design, parity generator, multiplexers, grey to binary code converter.

Learning Outcomes:

At the end of the unit, the student will be able to:

- Appreciate the importance, models and limitations of scaling.(L1)
- Explain the building blocks of data path of any system using gates.(L1)

UNIT V

Programmable Logic Devices: Read only memories, Programmable Logic Arrays (PLA), Programmable Array Logic (PAL), Complex programmable logic devices, Field programmable gate arrays.

Learning Outcomes:

At the end of the unit, the student will be able to:

- Explain different programmable logic devices.(L1)
- Compare the performance parameters and applications of different programmable logic devices.(L2)

TEXTBOOKS:

1. Kamran Eshraghian. Douglas, A. Pucknell and SholehEshraghian, "Essentials of LSI Circuits and Systems", Prentice Hall of India Private Limited, 2005 Edition.
2. Neil H.E.WESTE, David HarrisandAyan Banerjee, "CMOS VLSI Design A Circuits and systems perspective", Pearson Education, 2006 Third Edition

REFERENCES:

1. Richa Jain and Amrita Rai, "Principles of VLSI and CMOS Integrated Circuits", S.Chandand Company Limited. First edition.2012.
2. Wayne Wolf, "Modern VLSI Design", Pearson Education, 3rd Edition.

Course Outcomes:

At the end of this course, the students will be able to

- Understand different steps involved in the fabrication of ICs and electrical properties of MOS devices. (L2)
- Know the design rules in drawing the layout of any logic circuit.(L1)
- Compare different types of logic gates using CMOS inverter and their transfer characteristics.(L2)
- Learn the concepts to design building blocks of data path of any system using gates.(L1)
- Gain knowledge about basic programmable logic devices and testing of CMOS circuits.(L1)

B.Tech IV Year I Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS)::PULIVENDULA

20ACS75A- APPLICATIONAS OF AI

(Open Elective-III)

L	T	P	C
3	0	0	3

Course Objectives:

- Define Artificial Intelligence and establish the cultural background for study Understand various learning algorithms
- Explore the searching and optimization techniques for problem solving
- Provide basic knowledge on Natural Language Processing and Robotics

UNIT – I: Introduction

What is AI, Foundations of AI, History of AI, The State of Art. Intelligent Agents: Agents and Environments, Good Behaviour: The Concept of Rationality, The Nature of Environments, The Structure of Agents.

Learning Outcomes:

At the end of this unit, the student will be able to

- Recognize the importance of Artificial Intelligence **L1**
- Identify how intelligent agent is related to its environment **L2**

UNIT – II: Solving Problems by searching:

Problem Solving Agents, Example problems, Searching for Solutions, Uninformed Search Strategies, Informed search strategies, Heuristic Functions, Beyond Classical Search: Local Search Algorithms and Optimization Problems, Local Search in Continues Spaces, Searching with Nondeterministic Actions, Searching with partial observations, online search agents and unknown environments.

Learning Outcomes:

At the end of this unit, the student will be able to

- Explain how an agent can formulate an appropriate view of the problem it faces. **L2**
- Solve the problems by systematically generating new states **L2**

UNIT – III: Reinforcement Learning:

Introduction, Passive Reinforcement Learning, Active Reinforcement Learning, Generalization in Reinforcement Learning, Policy Search, applications of RL 10 Page Natural Language Processing: Language Models, Text Classification, Information Retrieval, Information Extraction..

Learning Outcomes:

At the end of this unit, the student will be able to

- Examine how an agent can learn from success and failure, reward and punishment. **L5**
- Develop programs that make queries to a database, extract information from texts, and retrieve relevant documents from a collection using Natural Language Processing. **L6**

UNIT-IV: Natural Language for Communication

Phrase structure grammars, Syntactic Analysis, Augmented Grammars and semantic Interpretation, Machine Translation, Speech Recognition Perception: Image Formation, Early Image Processing Operations, Object Recognition by appearance, Reconstructing the 3D World, Object Recognition from Structural information, Using Vision.

Learning Outcomes:

At the end of this unit, the student will be able to

- Develop programs that translate from one language to another, or recognize spoken words. **L6**
- Explain the techniques that provide robust object recognition in restricted context. **L2**

UNIT – V: Robotics:

Introduction, Robot Hardware, Robotic Perception, Planning to move, planning uncertain movements, Moving, Robotic software architectures, application domains Philosophical foundations: Weak AI, Strong AI, Ethics and Risks of AI, Agent Components, Agent Architectures, Are we going in the right direction, What if AI does succeed.

Learning Outcomes:

At the end of this unit, the student will be able to

- Explain the role of Robot in various applications.
- List the main philosophical issues in AI.

Text Books:

1. Stuart J.Russell, Peter Norvig, "Artificial Intelligence A Modern Approach", 3rd Edition, Pearson Education, 2019.

Reference Books:

1. Nilsson, Nils J., and Nils Johan Nilsson. Artificial intelligence: a new synthesis. Morgan Kaufmann, 1998.
2. Johnson, Benny G., Fred Phillips, and Linda G. Chase. "An intelligent tutoring system for the accounting cycle: Enhancing textbook homework with artificial intelligence." Journal of Accounting Education 27.1 (2009): 30-39.

Course Outcomes:

At the end of this Course the student will be able to

• Apply searching techniques for solving a problem	**L3**
• Design Intelligent Agents	**L6**
• Develop Natural Language Interface for Machines	**L6**
• Design mini robots	**L6**
• Summarize past, present and future of Artificial Intelligence	**L5**

B.Tech IV Year I Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS)::PULIVENDULA

20ACS75B- MOBILE APPLICATION DEVELOPMENT

(Open Elective-III)

L	T	P	C
3	0	0	3

Course Objectives:

- Android Application Development course is designed to quickly get you up to speed with writing apps for Android devices. The student will learn the basics of Android platform and get to understand the application lifecycle

UNIT – I:

Introduction Android Programming: What is Android, Activities, Linking Activities Using Intents, Fragments, Calling Built – in Applications using Intents, Displaying Notifications.

Learning Outcomes:

At the end of this unit, the student will be able to

- demonstrate their understanding of the fundamentals of Android operating systems **L2**
- demonstrate their skills of using Android software development tools **L2**

UNIT – II:

Android User Interface: Understanding the Components of a Screen, Adapting to Display Orientation, Managing Changes to Screen Orientation, Utilizing the Action Bar, Listening for UI Notifications.

Learning Outcomes:

At the end of this unit, the student will be able to

- demonstrate their ability to develop software with reasonable complexity on mobile platform **L3**
- demonstrate their ability to deploy software to mobile devices **L3**

UNIT – III:

Designing User Interface with Views: Basic Views, Picker Views, Using List Views to Display Long Lists.

Learning Outcomes:

At the end of this unit, the student will be able to

- demonstrate their ability to debug programs running on mobile devices **L4**
- demonstrate their ability to deploy software to mobile devices **L4**

UNIT-IV:

Displaying pictures and menus with views and Data Persistence: Views to Display pictures, menus with views, additional views, saving and loading user preferences, persisting data to files, creating and using databases.

Learning Outcomes:

At the end of this unit, the student will be able to

- demonstrate their skills of using Android software development tools **L4**
- demonstrate their ability to develop software with reasonable complexity on mobile platform **L5**

UNIT – V:

Content Providers: Sharing data in android, using a content provider, creating your own content providers.

Messaging and Networking: SMS Messaging, Sending E-Mail, Networking

Location-Based Services: Displaying Maps, Getting Location Data.

Learning Outcomes:

At the end of this unit, the student will be able to

- demonstrate their ability to deploy software to mobile devices **L5**
- demonstrate their ability to debug programs running on mobile devices **L5**

Text Books:

1. Beginning Android 4 Application Development, Wei-Meng Lee, Wiley India
2. Beginning Swift Programming, Wei-Meng Lee, December 2014, ISBN: 978-1-119-00931-3

Reference Books:

1. Enterprise J2ME: Developing Mobile Java Applications, Michael Juntao Yuan, Pearson Education, 2004.
2. Android Application Development for Java programming by James C. Sheusi, Cengage Learning
3. Android A Programmers Guide by Jerome DiMargio, TMH.

Course Outcomes:

At the end of this Course the student will be able to

• demonstrate their understanding of the fundamentals of Android operating systems	**L3**
• demonstrate their skills of using Android software development tools	**L4**
• demonstrate their ability to develop software with reasonable complexity on mobile platform	**L5**

B.Tech III Year I Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

20AECH01- WIRELESS AND MOBILE COMMUNICATION

(Honors Degree)

L–T – P - C
3 – 1 – 0 – 4

Course Objectives:

- To study about the channel planning for Wireless systems.
- To know about the large scale path loss in Mobile Radio Propagation.
- To learn about the small scale fading and multipath fading in Mobile Radio Propagation.
- To comprehend the concepts of Equalizers and Diversity techniques.
- To study about the Wireless networks and their standards.

UNIT - I

The Cellular Concept: System design fundamentals: Introduction, Frequency reuse, Channel assignment Strategies, Handoff strategies- Prioritizing handoffs, Practical handoff considerations, Interference and system capacity – Co channel Interference and system capacity, Channel planning for wireless systems, Adjacent channel interference, Power control for reducing interference, Trunking and Grade of service, Improving coverage & capacity in Cellular systems- Cell splitting, sectoring.

UNIT - II

Mobile Radio Propagation-Large-Scale Path Loss: Introduction to Radio wave propagation, Free space propagation model, relating power to electric field, Three basic propagation mechanisms, Reflection, Ground reflection (Two-Ray) model, Diffraction, Scattering, Outdoor propagation models, Indoor propagation models, Signal penetration into buildings, Ray tracing and Site specific modeling.

UNIT - III

Mobile Radio Propagation - Small Scale Fading and Multipath Fading : Small scale multipath propagation, factors influencing small scale fading, Doppler shift, Impulse response model of a multipath channel, relationship between bandwidth and received power, Small-scale multipath measurements, Parameters of mobile multipath channels, Types of Small-scale fading- fading effects due to multipath time delay spread, fading effects due to Doppler spread, statistical models for multipath fading channels, Clarke's model for flat fading, spectral shape due to Doppler spread in Clarke's model, Simulation of Clarke and Gans Fading Model, Level crossing and fading statistics, Two-ray Rayleigh fading model.

UNIT - IV

Equalization and Diversity: Introduction, Fundamentals of equalization, Training a generic adaptive equalizer, equalizers in a communication receiver, Linear equalizers, Non-linear equalization, Algorithms for adaptive equalization. Diversity techniques - Derivation of selection, diversity improvement, Derivation of maximal ratio combining improvement, Practical space diversity consideration, Polarization diversity, Frequency diversity, Time diversity, RAKE receiver.

UNIT - V

Wireless Networks: Introduction to wireless networks, Advantages and disadvantages of Wireless local area networks, WLAN topologies, WLAN standard IEEE 802.11, IEEE 802.11 Medium access control, Comparison of IEEE 802.11 a, b, g and n standards, IEEE 802.16 and its enhancements, Wireless PANs, HiperLan, WLL.

Textbooks:

1. Wireless Communications, Principles, Practice – Theodore, S. Rappaport, 2nd Ed., 2002, PHI.
2. Wireless Communications-Andrea Goldsmith, 2005 Cambridge University Press.

Reference Books:

1. Wireless Digital Communications – KamiloFeher, 1999, PHI.
2. Wireless Communication and Networking – William Stallings, 2003, PHI.
3. Principles of Wireless Networks – KavehPahLaven and P. Krishna Murthy, 2002, PE.
4. Mobile Cellular Communication – GottapuSasibhushana Rao, Pearson Education, 2012.

Course Outcomes (CO): Student will be able to

- Know about the channel planning for Wireless systems.
- Learn about the large scale path loss in Mobile Radio Propagation.
- Understand the small scale fading and multipath fading in Mobile Radio Propagation.
- Comprehend the concepts of Equalizers and Diversity techniques.
- Know about the Wireless networks and their standards.

B.Tech III Year I Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

20AECH02- 5G COMMUNICATIONS

(Honors Degree)

L – T – P - C
3 – 1 – 0 – 4

Course Objectives:

- To know about the evolution and advancements of mobile technologies.
- To learn about the channel models and their requirements.
- To understand the requirements of transmission over 5G and modulation techniques.
- To acquire knowledge on D2D and M2M communications.
- To gain the knowledge about millimeter wave communications.

UNIT - I

Overview of 5G Broadband Wireless Communications: Evolution of mobile technologies 1G to 4G (LTE, LTEA, LTEA Pro), An overview of 5G requirements, Regulations for 5G, Spectrum analysis and sharing for 5G.

UNIT - II

The 5G wireless Propagation Channels: Channel modeling requirements, propagation scenarios and challenges in the 5G modeling, Channel Models for mmWave MIMO Systems.

UNIT - III

Transmission and Design Techniques for 5G: Basic requirements of transmission over 5G, Modulation techniques – Orthogonal frequency division multiplexing (OFDM), generalized frequency division multiplexing (GFDM), filter bank multi-carriers (FBMC) and universal filtered multi-carrier (UFMC), Multiple accesses techniques – orthogonal frequency division multiple accesses (OFDMA), generalized frequency division multiple accesses (GFDMA), non-orthogonal multiple accesses (NOMA).

UNIT - IV

Device-to-Device (D2D) and Machine-to-Machine (M2M) type Communications: Extension of 4G D2D standardization to 5G, radio resource management for mobile broadband D2D, multihop and multi-operator D2D communications.

UNIT - V

Millimeter-wave Communications: Spectrum regulations, deployment scenarios, beamforming, physical layer techniques, interference and mobility management, Massive MIMO propagation channel models, Channel Estimation in Massive MIMO, Massive MIMO with imperfect CSI, Multi-cell Massive MIMO, Pilot contamination, Spatial modulation (SM).

Textbooks:

1. Martin Sauter "From GSM From GSM to LTE–Advanced Pro and 5G: An Introduction to Mobile Networks and Mobile Broadband", Wiley-Blackwell.
2. AfifOsseiran, Jose.F. Monserrat, Patrick Marsch, "Fundamentals of 5G Mobile Networks", Cambridge University Press.

Reference Books:

1. Jonathan Rodriguez, "Fundamentals of 5G Mobile Networks", John Wiley & Sons.
2. AmitabhaGhosh and Rapeepat Ratasuk "Essentials of LTE and LTE-A", CambridgeUniversity Press
3. Athanasios G. Kanatos, Konstantina S. Nikita, PanagiotisMathiopoulos, "New Directions in Wireless Communication Systems from Mobile to 5G", CRC Press.

4. Theodore S. Rappaport, Robert W. Heath, Robert C. Danials, James N. Murdock "Millimeter Wave Wireless Communications", Prentice Hall Communications.

Course Outcomes (CO): Student will be able to

- Know about the evolution and advancements of mobile technologies.
- Learn about the channel models and their requirements.
- Understand the requirements of transmission over 5G and modulation techniques.
- Acquire knowledge on D2D and M2M communications.
- Gain the knowledge about millimeter wave communications.

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

20AECH03- LOW POWER VLSI DESIGN

(Honors Degree)

L–T – P - C
3 – 1 – 0 – 4

Course Objectives:

- To understand the basic concepts related to low power circuit design.
- To implement Low power design approaches for system level and circuit level measures.
- To design different types of low voltage low power adders.
- To design and analyze different types of low voltage multipliers.
- To gain knowledge on different types of memories for efficient design of systems.

UNIT - I

Fundamentals: Need for low power circuit design, Sources of power dissipation – Static and dynamic power dissipation, Short circuit power dissipation, Glitching power dissipation, Short channel effects –Drain induced barrier lowering and punch through, Surface scattering, Velocity saturation, Impact ionization, Hot electron effect.

UNIT - II

Low-Power Design Approaches: Low-Power design through Voltage scaling – VTCMOS circuits, MTCMOS circuits, Architectural level approach –Pipelining and parallel processing approaches. Switched capacitance minimization approaches: System level measures, Circuit level measures, Mask level measures.

UNIT - III

Low-Voltage Low-Power Adders: Introduction, Standard adder cells, CMOS Adder's architectures – Ripple carry adders, Carry look ahead adders, Carry select adders, Carry save adders, Low-voltage low-power design techniques – Trends of technology and power supply voltage, low-voltage low-power logic styles.

UNIT - IV

Low-Voltage Low-Power Multipliers: Introduction, Overview of multiplication, Types of multiplier architectures, Braun multiplier, Baugh Wooley multiplier, Booth multiplier, Introduction to Wallace Tree Multiplier.

UNIT - V

Low-Voltage Low-Power Memories: Basics of ROM, Low-power ROM technology, future trends and development of ROMs, Basics of SRAM, Memory cell, Pre-charge and equalization circuit, Low-Power SRAM technologies, Basics of DRAM, Self-refresh circuit, Future trends and development of DRAM.

Textbooks:

1. CMOS Digital Integrated Circuits – Analysis and Design – Sung-Mo Kang, Yusuf Leblebici, TMH, 2011.
2. Low-Voltage, Low-Power VLSI Subsystems – Kiat-Seng Yeo, Kaushik Roy, TMH Professional Engineering.

Reference Books:

1. Introduction to VLSI Systems: A Logic, Circuit and System Perspective – Ming-BO Lin, CRC Press, 2011.
2. Low Power CMOS Design – AnanthaChandrakasan, IEEE Press/Wiley International, 1998.
3. Low Power CMOS VLSI Circuit Design – Kaushik Roy, Sharat C. Prasad, John Wiley & Sons, 2000.

Course Outcomes (CO): Student will be able to

- Understand the basic concepts related to low power circuit design.
- Implement Low power design approaches for system level and circuit level measures.
- Design different types of low voltage low power adders.
- Design and analyze different types of low voltage multipliers.
- Gain knowledge on different types of memories for efficient design of systems.

B.Tech III Year II Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

20AECH04- EMBEDDED SYSTEMS & IOT

(Honors Degree)

L–T – P - C
3 – 1 – 0 – 4

Course Objectives:

- To understand the Architecture, Development & Design of Embedded Systems and IoT.
- To learn the architecture and programming of ARM Microcontroller.
- To be able to work with Raspberry Pi using Python Programming.
- To know about the IoT standards, communication technologies and protocols.
- To implement real time projects using the tools and techniques of IoT Platform.

UNIT I

Introduction to Embedded Systems and Internet of Things (IoT): Introduction, Hardware & Software Architecture of Embedded Systems, Embedded Systems Development process, Architecture of Internet of Things, Physical Design & Logical Design of IoT, IoT Enabling Technologies, IoT Levels & Deployment Tools, Applications of Embedded Systems and IoT, Design Methodology for IOT Products.

Learning Outcomes:

At the end of the unit, the student will be able to:

- Gain knowledge on working of Embedded systems and IoT Architectures. (L1)
- Understand the Development, Design and applications of Embedded systems and IoT. (L2)

UNIT II

ARM Microcontrollers Architecture and Programming: Architecture, Pin Diagram, Register Set & Modes, Memory Organization, Instruction set, Programming ports, Timer/Counter, Serial communication, I/O System, Development Tools, interrupts in C, Introduction ARM mBed platform.

Learning Outcomes:

At the end of the unit, the student will be able to:

- Understand the architecture, usage of Register set and Programming model of ARM Microcontrollers. (L2)
- Work with ARM Microcontrollers in implementing real time projects.(L6)

UNIT III

Fundamentals of Python Programming & Raspberry Pi: Introduction to python programming, Data Types & Data Structures, working with functions, Modules & Packages, File Handling, classes, RESTfull Web Services, Client Libraries, Introduction & programming Raspberry Pi3, Interfaces, Integrating Input Output devices with Raspberry Pi3

Learning Outcomes:

At the end of the unit, the student will be able to:

- Write programs using Python to implement the given task with different Data Types, Structures & Modules.(L6)
- Use Raspberry Pi3 for integrating Input & Output devices. (L3)

UNIT IV

IoT Technologies, Standards, Tools &M2M Network: Fundamental characteristics and high-level requirements of IoT, IoT Reference models; Introduction to Communication Technologies & Protocols of IoT: BLE, Wi-Fi, LoRA, 3G/4G Technologies and HTTP, MQTT, CoAP protocols; Relevant Practicals on above technologies, M2M Network, SDN (Software Defined Networking) & NFV (Network Function Virtualization) for IoT

Learning Outcomes:

At the end of the unit, the student will be able to:

- Understand the characteristics and high-level requirements to design new IoT devices. (L2)
- Summarize different Communication Technologies, Protocols & Networks of IoT. (L2)

UNIT V

IoT Platform, Cloud Computing Platforms &Data Analytics for IoT Development: IOT Platform Architecture (IBM Internet of Things & Watson Platforms); API Endpoints for Platform Services; Devices Creation and Data Transmission; Introduction to NODE-RED and Application deployment, Introduction to Data Analytics, Apache Hadoop, Apache Oozie, Spark & Storm

Learning Outcomes:

At the end of the unit, the student will be able to:

- Learn how to use API Endpoints for Platform Services, Devices Creation and Data Transmission. (L1)
- To implement real time projects using the Cloud Computing tools and Data Analytic techniques of IoT Platform. (L6)

TEXT BOOKS

1. ArsheepBahga, Vijay Madisetti, "Internet of Things: A Hands-On Approach", 1^{st} Edition, VPT, 2014.
2. K.V.K.K.Prasad, "Embedded Real Time Systems: Concepts, Design and Programming", 1^{st} Edition, Dreamtech Publication, 2014.
3. Adrian McEwen, Hakim Cassimally, "Designing the Internet of Things", Wiley Publications, 2013

REFERENCES

1. Jonathan W Valvano, "Embedded Microcomputer Systems: Real-Time Interfacing", 3^{rd} Edition, Thomson Engineering, 2012.
2. Olivier Hersent, David Boswarthick, Omar Elloumi, "The Internet of Things: Key applications and Protocols", 2^{nd} Edition, Wiley Publications, 2012.
3. Rene Beuchat , Andrea Guerrieri & SahandKashani "Fundamentals of System-on-Chip Design on Arm Cortex-M Microcontrollers" Paperback, 2 August 2021.

Course outcomes:

At the end of this course, the students will be able to

- Understand the Levels of Design & Development of Embedded Systems and IoT.(L2)
- Correlate the architecture and programming of ARM Microcontroller with different modules. (L4)
- Work with Raspberry Pi using Python Programming. (L6)
- Summarize IoT standards, communication technologies, protocols and Networks. (L2)
- Implement real time projects using the tools, techniques and Data Analytics of IoT Platform. (L6)

B.Tech III Year I Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

20AECM01- ELECTRONIC CIRCUITS

(Minor Degree)

L – T – P - C
3 – 1 – 0 – 4

COURSE OBJECTIVES:

- To learn about the construction, operation and applications of semiconductor diode and special purpose diodes.
- To understand the construction and working of BJT along with the biasing and stabilization circuits.
- To gain knowledge about the classification and operation of amplifiers.
- To understand the basic principlesand working of feedback amplifiers and oscillators.
- To study the operation,characteristics and applications of op-amp.

UNIT-I

Semiconductor Diode and Applications: Introduction, PN junction diode – structure, operation and VI characteristics, Half-wave, Full-wave and Bridge Rectifiers with and without Filters, Positive and Negative Clipping and Clamping circuit,

Special Diodes: Zener and Avalanche Breakdowns, VI Characteristics of Zener diode, Zener diode as voltage regulator, Construction, operation and VI characteristics of Tunnel Diode, LED, Photo Diode .

Learning Outcomes:

At the end of the unit, the student will be able to

- Identify different materials used for an electronic device & describe the characteristics of various diodes and Design power supplies using Rectifiers and Filters
- Know the usage of special diodes, clipping and clamping circuits in different applications.

UNIT-II

Bipolar Junction Transistor (BJT): Principle of Operation, Common Emitter, Common Base and Common Collector Configurations, Transistor as a switch and Amplifier, Transistor Biasing and Stabilization - Operating point, DC & AC load lines, Biasing - Fixed Bias, Self Bias, Bias Stability, Bias Compensation using Diodes.

Learning Outcomes:

At the end of the unit, the student will be able to

- llustrate various biasing Techniques for a transistor and perform DC , AC Analysis.
- Analyze the operation, characteristics and applications of BJT.

UNIT-III

Amplifiers: Classification of Amplifiers, Amplifier in CE, CC and CB configuration. Different Coupling Schemes used in Amplifiers, Two stage RC coupled amplifier.

Learning Outcomes:

At the end of the unit, the student will be able to

- Evaluate frequency response to understand behavior of various amplifier circuits.
- Analyse the Different coupling Schemes their advantages and performance of multistage amplifiers.

UNIT-IV

Feedback amplifiers: Concepts of feedback, Classification of feedback amplifiers, Effect of feedback on amplifier characteristics, Voltage Series, Voltage Shunt, Current Series and Current Shunt Feedback Configurations.

Oscillators: Classification of oscillators, Condition for oscillations, Working of RC Phase shift Oscillator, Hartley Oscillator, Colpitts Oscillator, Wien Bridge Oscillator.

Learning Outcomes:

At the end of the unit, the student will be able to

- Analyse the characteristics of various types of feedback configurations
- Identify the different feedback amplifiers and design various low and high frequency oscillators.

UNIT-V

Op-amp: Classification of IC'S, basic information of Op-amp, ideal and practical Op-amp, 741 op-amp and its features, modes of operation-inverting, non-inverting, differential.

Applications of op-amp : Summing, scaling and averaging amplifiers, Integrator, Differentiator, phase shift oscillator and comparator.

Learning Outcomes:

At the end of the unit, the student will be able to

- Design and analyze different amplifiers using op-amp.
- Analyze the linear and non-linear applications of operational amplifiers.

TEXT BOOKS:

1. Electronics Devices and Circuits, J.Millman and Christos. C. Halkias, 3rd edition, Tata McGraw Hill, 2006.
2. Electronic Devices and Circuit Theory, Robert L.Boylestad, Louis Nashelsky, 9th Edition, Pearson, 2008.
3. Ramakanth A.Gayakwad,"Op-amps and Linear ICs", 4th Edition, PHI, 1987.
4. Electronic Devices and Circuits, N.Salivahanan, and N.Suresh Kumar, 3rd Edition, TMH, 2012

REFERENCE BOOKS:

1. Microelectronic Circuits, S.Sedra and K.C.Smith, 5th Edition, Oxford University Press.
2. Electronic Circuits Analysis and Design, Donald A Neamen, 3rd Edition, Tata McGraw-Hill, 2009.
3. D.RoyChowdhury, "Linear integrated circuits", 2nd Edition, New Age International (P) Ltd, 2003.

COURSE OUTCOMES:

After the completion of the course, students will be able to

- Learn about the construction, operation and applications of semiconductor diode and special purpose diodes.
- Understand the construction and working of BJT along with the biasing and stabilization circuits.
- Gain knowledge about the classification and operation of amplifiers.
- Understand the basic principles and working of feedback amplifiers and oscillators.
- Know the operation, characteristics and applications of op-amp.

B.Tech III Year I Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

20AECM02- DIGITAL ELECTRONICS

(Minor Degree)

L – T – P - C
3 – 1 – 0 – 4

Course objectives:

- To learn simplification methods for minimizing boolean functions and their realization using logic gates.
- To understand and design various combinational logic circuits like adders and code converters.
- To know the design of various combinational circuits useful to implement logic functions.
- To study the design of sequential logic circuits in synchronous and asynchronous modes.
- To introduce programmable logic devices.

UNIT-I

Logic Simplification and Combinational Logic Design: Review of Boolean Algebra and De Morgan's Theorem, SOP & POS forms, Canonical forms, Introduction to Logic Gates, Ex-OR, Ex-NOR operations, Minimization of Switching Functions: Karnaugh map method, Quine –McCluskey Tabular Minimization Method. Logic function realization: AND-OR, OR-AND and NAND/NOR realizations.

Learning Outcomes:

At the end of the unit, the student will be able to

- Apply basic laws & De Morgan's theorems to simplify Boolean expressions (L3)
- Compare K- Map&Q-M methods of minimizing logic functions (L5)

UNIT-II

Introduction to Combinational Design 1: Binary Adders, Subtractors and BCD adder, Code converters - Binary to Gray, Gray to Binary, BCD to excess3, BCD to Seven Segment display.

Learning Outcomes:

At the end of the unit, the student will be able to

- Apply Boolean algebra for describing combinational digital circuits (L3)
- Analyze standard combinational circuits such as adders, subtractors and code converters etc. (L4)

UNIT-III

Combinational Logic Design 2: Decoders (3 to 8, octal to decimal), Encoders, Priority Encoders, Multiplexers, Demultiplexers, Comparators, Implementations of Logic Functions using Decoders and Multiplexers.

Learning Outcomes:

At the end of the unit, the student will be able to

- Apply Boolean algebra for describing combinational digital circuits (L3).
- Design and analyse various Combinational logic circuits (L6).

UNIT-IV

Sequential Logic Design: Latches, Flipflops, S-R, D, T, JK and Master-Slave JK FF, Edge triggered FF, flipflop conversions, set up and hold times, Ripple and Synchronous counters, Shift registers.

Learning Outcomes:

At the end of the unit, the student will be able to

- Describe behaviour of Flip-Flops and Latches (L1).
- Design sequential circuits using flip flops , registers and counters (L6).

UNIT-V

Programmable Logic Devices:ROM, Programmable Logic Devices (PLDs), Introduction to logic families and theircomparisons.

Learning Outcomes:

At the end of the unit, the student will be able to

- Describe functional differences between different types of memories (L1).
- Compare different types of Programmable Logic Devices (L2).

TEXT BOOKS:

1. Digital Design. M.Morris Mano & Michel D. Ciletti, 5th Edition, Pearson Education, 1999.
2. Switching theory and Finite Automata Theory, ZviKohavi and NirahK.Jha, 2nd Edition, Tata McGraw Hill, 2005.

REFERENCE BOOKS:

1. Fundamentals of Logic Design, Charles H Roth,Jr., 5th Edition, Brooks/coleCengage Learning, 2004.
2. Digital & State Machine Design, Comer, 3rd Edition, OXFORD.

Course Outcomes:

After the completion of the course, students will be able to

- Learn simplification methods for minimizing boolean functions and their realization using logic gates.
- Understand and design various combinational logic circuits like adders and code converters.
- Know the design of various combinational circuits useful to implement logic functions.
- Gain knowledge on the design of sequential logic circuits in synchronous and asynchronous modes.
- Understand the operation and uses of programmable logic devices.

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

20AECM03- PRINCIPLES OF COMMUNICATIONS

(Minor Degree)

L–T – P - C
3 – 1 – 0 – 4

Course Objectives:

- To understand the importance of modulation and Amplitude modulation.
- To know about the frequency modulation and phase modulation.
- To study different types of pulse analog modulation techniquesand multiple access techniques.
- To gain knowledge on pulse code modulation and different waveform coding techniques.
- To comprehend the wireless communication systems, their evolution and standards.

UNIT I:

Analog communication-I: Elements of communication systems need for Modulation, Modulation Methods, Amplitude Modulation(AM),Generation of AM signals, Rectifier detector, Envelope detector, sideband and carrier power of AM, Double side band suppressed carrier(DSB-SC) modulation & its demodulation, Switching modulators, Ring modulator, Balanced modulator, Single sideband(SSB) transmission, VSB Modulation.

Learning Outcomes:

At the end of the unit, the student will be able to:

- Understand the basic elements of communication systems.(L2)
- Compare the performance of analog modulation schemes.(L2)

UNIT II:

Analog communication-II: Angle Modulation & Demodulation: Concept of instantaneous frequency Generalized concept of angle modulation, Bandwidth of angle modulated waves- Narrow band frequency modulation (NBFM); and Wide band FM (WBFM),Phase modulation..

Learning Outcomes:

At the end of the unit, the student will be able to:

- Compare the performance of different frequency modulated schemes.(L2)
- Learn about the Pre-emphasis & De-emphasis circuits in frequency modulation.(L1)

UNIT III:

Digital communications-I (Qualitative Approach only) :Pulse Analog Modulation Techniques : Pulse analog modulation techniques, Generation and detection of Pulse amplitude modulation, Pulse width modulation, Pulse position modulation

Multiple Access Techniques: Introduction to multiple access techniques, FDMA,TDMA, CDMA, Advantages and applications.

Learning Outcomes:

At the end of the unit, the student will be able to:

- Analyze the performance of different pulse modulation techniques.(L4)
- Understand the basic principles of Multiple Access Techniques.(L2)

UNIT IV:

Digital communications-II (Qualitative Approach only) : Pulse Code Modulation, DPCM, Delta modulation, Adaptive delta modulation, Overview of ASK, PSK, QPSK, BPSK techniques.

Unit Outcomes:

Learning Outcomes:

At the end of the unit, the student will be able to:

- Understand the performance of different types of digital modulation schemes.(L2)
- Explain different types of waveform coding techniques and their applications.(L1)

UNIT V:

Wireless communications (Qualitative Approach only) : Introduction to wireless communication systems. Examples of wireless communication systems, comparison of 1G to 5G cellular networks, Introduction to wireless networks, Differences between wireless and fixed telephone networks, Introduction to Global system for mobile(GSM),GSM services and features.

Learning Outcomes:

At the end of the unit, the student will be able to:

- Understand various types of wireless communication systems.(L2)
- Explain GSM services and features.(L1)

TEXT BOOKS

1. H Taub, D. Schilling and GautamSahe, "Principles of Communication Systems", TMH, 2007, 3rd Edition
2. George Kennedy and Bernard Davis, "Electronics & Communication System", 4th Edition, TMH 2009
3. Wayne Tomasi, "Electronic Communication System: Fundamentals Through Advanced",2nd editions,PHI,2001.

REFERENCE BOOKS

1. Simon Haykin, "Principles of Communication Systems", John Wiley, 2nd Edition.
2. Sham Shanmugam," Digital and Analog communication Systems",Wiley-India edition,2006.
3. Theodore. S.Rapport, "Wireless Communications", Pearson Education,2nd Edition,2002.

Course outcomes:

At the end of this course, the students will be able to

- Understand the importance of modulation and Amplitude modulation.(L2)
- Summarize the frequency modulation and phase modulation methods.(L2)
- Explain about different types of pulse analog modulation techniques and multiple access techniques.(L3)
- Acquire knowledge on pulse code modulation and different waveform coding techniques.(L1)
- Comprehend the wireless communication systems, their evolution and standards.(L1)

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

20AECM04- ELECTRONIC INSTRUMENTATION

(Minor Degree)

L – T – P – C
3 – 1 – 0 – 4

Course Objectives:

- To know about the performance characteristics of instruments and measurement of electrical quantities.
- To understand the construction, working and applications of different types of CRO''s.
- To analyze the working of different types of bridges.
- To study the working of signal & function generators.
- To analyze the working of transducers in measuring physical parameters.

UNIT I

Measuring Instruments: Introduction, Errors in Measurement, Accuracy, Precision, Resolution and Significant figures.Basic PMMC Meter- construction and working, DC and AC Voltmeters-Multirange, Range extension, DC Ammeter, Multimeter for Voltage, Current and resistance measurements.

Digital Instruments: Digital Voltmeters – Introduction, DVM's based on V–T, V–F and Successive approximation principles, Resolution and sensitivity, General specifications, Digital Multimeters, Digital frequency meters, Digital measurement of time.

Learning Outcomes:

At the end of the unit, the student will be able to:

- Learn about the performance characteristics of the instruments.(L1)
- Understand the working of different types of ammeters, voltmeters and multimeters. (L2)

UNIT II

Oscilloscopes: Introduction, Block diagram of CRO, Basic principle of CRT, CRT Construction and features, vertical amplifiers, horizontal deflection system- sweep, trigger pulse, delay line, sync selector circuits. Dual beam and dual trace CROs, Sampling and Digital storage oscilloscopes.

Learning Outcomes:

At the end of the unit, the student will be able to:

- Grasp the construction and working of different types of oscilloscopes.(L1)
- Use CRO to measure the amplitude, frequency, phase and time period of given signals.(L3)

UNIT III

Bridges: DC Bridges for Measurement of resistance - Wheat stone bridge, Kelvin's Bridge, AC Bridges for Measurement of inductance- Maxwell's bridge, Hay's Bridge, Anderson bridge, Measurement of capacitance - Schearing Bridge, Wien Bridge, Errors and precautions in using bridges.

Learning Outcomes:

At the end of the unit, the student will be able to:

- Understand the construction and working of different types of bridges.(L2)
- Measure parameters like resistance, capacitance, and inductance using bridges.(L3)

UNIT IV

Signal Generators: Introduction, Fixed and variable AF oscillator, Standard signal generator, Laboratory type signal generator, AF sine and Square wave generator, Function generator, Square and Pulse generator, Sweep frequency generator.

Learning Outcomes:

At the end of the unit, the student will be able to:

- Understand the working and applications of signalgenerators.(L2)
- Gain knowledge on the working and applications of function generators.(L1)

UNIT V

Transducers: Introduction, Types of Transducers, Electrical transducers, Selecting a transducer, Resistive transducer, Strain gauges, Piezoelectric transducer, Photoelectric transducer, Photovoltaic transducer, Temperature transducers-RTD, LVDT.

Learning Outcomes:

At the end of the unit, the student will be able to:

- Understand the basic working principle and applications of transducers.(L2)
- Measure physical parameters using different types transducers.(L3)

TEXT BOOKS

1. H.S.Kalsi, "Electronic Instrumentation", Third edition, Tata McGraw Hill, 2010.
2. A.D. Helfrick and W.D. Cooper, "Modern Electronic Instrumentation and Measurement Techniques", PHI, 6th Edition, 2010.

REFERENCE BOOKS

1. A.K. Sawhney, DhanpatRai& Co., "A course in Electrical and Electronic Measurements and Instrumentation", 9th Edition, 2010.
2. David A. Bell, "Electronic Instrumentation & Measurements", PHI, 2nd Edition, 2006.

Course outcomes:

At the end of this course, the students will be able to

- Know about the performance characteristics of instruments and measurement of electrical quantities. (L1)
- Understand the construction, working and applications of different types of CRO"s. (L2)
- Compare the working of different types of bridges.(L2)
- Learn the working of signal & function generators.(L1)
- Analyze the working of transducers in measuring physical parameters.(L4)