



**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR**  
(Established by Govt. of A.P., Act. No. 30 of 2008)  
ANANTHAPURAMU – 515 002 (A.P) INDIA

*Course Structure & Syllabus for B.Tech. (Regular)*  
*R13 Regulations*

**COMPUTER SCIENCE & ENGINEERING**

**B.Tech. I Year**

S.No	Course code	Subject	Th	Tu/	Lab.	Credits
1.	13A52101	Communicative English	2	-	-	3
2.	13A56101	Engineering Physics	2	-	-	3
3.	13A51101	Engineering Chemistry	2	-	-	3
4.	13A54101	Mathematics - I	3	1	-	5
5.	13A05101	Problem Solving & Computer Programming	3	1	-	5
6.	13A54102	Mathematics - II	3	1	-	5
7.	13A99101	Basic Electrical & Electronics Engineering	3	1	-	5
8.	13A05102	Computer Programming Lab	-	-	3	4
9.	13A99102	Engineering Physics & Engineering Chemistry Lab *	-	-	3	4
10.	13A99103	Engineering & IT Workshop #	-	-	3	4
11.	13A52102	English Language Comm. Skills Lab	-	-	3	4
Total Credits						45

Th = Theory; Tu = Tutorial & Lab = Laboratory:

\* The students shall attend the Physics lab and Chemistry lab in alternate 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.

**B.Tech. II - I Semester**

S.No	Course code	Subject	Th	Tu /Drg /Lab	Credits
1.	13A03304	Engineering Graphics	1	- 3 -	3
2.	13A54303	Probability and Statistics	3	1 - -	3
3.	13A01403	Environmental Science		1 - -	3
4.	13A05301	Data Structures	3	1 - -	3
5.	13A04306	Digital Logic Design	3	1 - -	3
6.	13A05302	Discrete Mathematics	3	1 - -	3
7.	13A99304	Electrical & Electronics Engineering Lab	-	- - 3	2
8.	13A05303	Data Structures Lab	-	- - 3	2
Total Credits					22

**B.Tech. II - II Semester**

S.No	Course code	Subject	Theory	Tu / Lab	Credits
1.	13A05401	Computer Organization & Architecture	3	1 -	3
2.	13A05402	Database Management Systems	3	1 -	3
3.	13A05403	Java Programming	3	1 -	3
4.	13A05404	Formal Languages & Automata Theory	3	1 -	3
5.	13A05405	Principles of Programming Languages	3	1 -	3
6.	13A05406	Design And Analysis of Algorithms	3	1 -	3
7.	13A05407	Database Management Systems Lab	-	- 3	2
8.	13A05408	Java Programming Lab	-	- 3	2
9.	13A52301	Human Values & Professional Ethics (Audit Course)	2	- -	-
Total Credits					22

**B.Tech. III - I Semester**

S.No	Course code	Subject	Theory	Tu / Lab	Credits
1.	13A05501	Operating Systems	3	1 -	3
2.	13A05502	Compiler Design	3	1 -	3
3.	13A05503	Unix and Shell Programming	3	1 -	3
4.	13A05504	Software Engineering	3	1 -	3
5.	13A04507	Micro Processors & Interfacing	3	1 -	3
6.	13A52501	Managerial Economics and Financial Analysis	3	1 -	3
7.	13A05505	Operating Systems Lab	-	- 3	2
8.	13A05506	Compiler Design and Assembly Language Programming Lab	-	- 3	2
9.	13A52502	Advanced English language Comm. Skills Lab (Audit Course)	-	- 3	
Total Credits					22

**B.Tech. III - II Semester**

S.No	Course code	Subject	Theory	Tu / Lab	Credits
1.	13A05601	Computer Networks	3	1 -	3
2.	13A05602	Object Oriented Analysis, Design & Modeling	3	1 -	3
3.	13A05603	Data Mining	3	1 -	3
4.	13A05604	Web Programming	3	1 -	3
5.	13A05605	Software Testing Methodologies	3	1 -	3
6.	13A05606	Advanced Computer Architecture	3	1 -	3
7.	13A05607	Unified Modeling Language and Data Mining Lab	-	- 3	2
8.	13A05608	Web Programming Lab	-	- 3	2
Total Credits					22

### B.Tech. IV - I Semester

S.No	Course code	Subject	Theory	Tu / Lab	Credits
1.	13A05701	Computer Graphics & Multimedia	3	1 -	3
2.	13A05702	Cryptography & Network Security	3	1 -	3
3.	13A05703	Service Oriented Architecture	3	1 -	3
4.	13A05704	Mobile Application Development	3	1 -	3
5.		<b>Elective – I</b> (Open Elective)	3	1 -	3
		<b>Elective –II</b>			
6.	13A05705	Information Retrieval Systems	3	1 -	3
	13A05706	Human Computer Interaction			
	13A05707	Computer Forensics			
	13A05708	Digital Image Processing			
7.	13A05709	Computer Networks and Network Security Lab	-	- 3	2
8.	13A05710	Mobile Application Development and Computer Graphics Lab	-	- 3	2
<b>Total Credits</b>					22

### B.Tech. IV - II Semester

S.No.	Course code	Subject	Theory	Tu / Lab	Credits
1.	13A52601	Management Science	3	1 -	3
2.	13A05801	Cloud Computing	3	1 -	3
		<b>Elective-III</b>			
3.	13A05802	Software Project Management	3	1 -	3
	13A05803	Software Architecture & Design Patterns			
	13A05804	Storage Area Networks			
	13A05805	Artificial Intelligence			
		<b>Elective-IV</b>			
4.	13A05806	Parallel and Randomized Algorithms	3	1 -	3
	13A05807	Embedded Systems			
	13A05808	Game Theory			
	13A05809	Adhoc and Sensor Networks			
5.	13A05810	Seminar & Comprehensive Viva-Voce	-	- -	3
6.	13A05811	Project	-	- -	10
<b>Total Credits</b>					25

# JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

**B.Tech. I Year**

<b>Th</b>	<b>Tu</b>	<b>C</b>
<b>2</b>	<b>0</b>	<b>3</b>

**Common to All Branches**

## **(13A52101) COMMUNICATIVE ENGLISH**

### **Preamble:**

*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 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 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 selected 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.*

### **Course Objective:**

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

### **Learning Outcome:**

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

## **UNIT I**

**Chapter entitled „Humour“ from “Using English”**

**Chapter entitled „Biography - (Homi Jehangir Bhabha)“ from “New Horizons”**

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**

**Chapter entitled „Inspiration“ from “Using English”**

**Chapter entitled „Biography - (Jagadish Chandra Bose)“ 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**

**Chapter entitled „Sustainable Development“ from “Using English” Chapter entitled „Short Story - (The Happy Prince)” 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**

**Chapter entitled „Relationships“ from “Using English”**

**Chapter entitled „Poem - (IF by Rudyard Kipling)” 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**

**Chapter entitled „Science and Humanism“ from “Using English”**

**Chapter entitled „Autobiography - (My Struggle for an Education by Booker T.Washington)” 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

#### **Text Books:**

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

#### **Reference Books:**

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.

## JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

**B.Tech. I Year**

<b>Th</b>	<b>Tu</b>	<b>C</b>
<b>2</b>	<b>0</b>	<b>3</b>

**Common to All Branches**

### **(13A56101) ENGINEERING PHYSICS**

#### **Preamble:**

*There has been an exponential growth of knowledge in the recent past opening up new areas and challenges in the understanding of basic laws of nature. This helped to the discovery of new phenomena in macro, micro and nano scale device technologies. The laws of physics play a key role in the development of science, engineering and technology. Sound knowledge of physical principles is of paramount importance in understanding new discoveries, recent trends and latest developments in the field of engineering.*

*To keep in pace with the recent scientific advancements in the areas of emerging technologies, the syllabi of engineering physics has been thoroughly revised keeping in view of the basic needs of all engineering branches by including the topics like optics, crystallography, ultrasonics, quantum mechanics, free electron theory. Also new phenomenon, properties and device applications of semiconducting, magnetic, superconducting and nano materials along with their modern device applications have been introduced.*

#### **Course Objective:**

- 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.*
- 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.*
- 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.*
- To open new avenues of knowledge and understanding on semiconductor based electronic devices, basic concepts and applications of semiconductor and magnetic materials have been introduced which find potential in the emerging micro device applications.*
- 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 modern emerging technologies are elicited.*

#### **Learning Outcome:**

- 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 focused on the basis for the band theory.*
- 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.*

## UNIT 1

### PHYSICAL OPTICS, LASERS AND FIBRE OPTICS:

**Physical Optics:** Introduction - Interference in thin films by reflection – Newton's Rings – Fraunhofer diffraction due to single slit, double slit and diffraction grating.

**Lasers:** Introduction - Characteristics of laser – Spontaneous and stimulated emission of radiation – Einstein's coefficients - Population inversion – Excitation mechanisms and optical resonator - Ruby laser - He-Ne laser – Applications of lasers.

**Fibre optics:** Introduction– Construction and working principle of optical fiber –Numerical aperture and acceptance angle – Types of optical fibers – Attenuation and losses in fibers - Optical fiber communication system – Applications of optical fibers in communications, sensors and medicine.

## UNIT II

### CRYSTALLOGRAPHY AND ULTRASONICS:

**Crystallography:** Introduction – Space lattice –Unit cell – Lattice parameters –Bravais 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 – X-ray diffraction - Bragg's law –Laue and Powder methods – Defects in solids: point defects, line defects (qualitative) - screw and edge dislocation, burgers vector.

**Ultrasonics:** Introduction – Production of ultrasonics by piezoelectric method – Properties and detection – Applications in non-destructive testing.

## UNIT III

### QUANTUM MECHANICS AND FREE ELECTRON THEORY:

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

**Free electron theory:** Classical free electron theory -- Sources of electrical resistance - 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 IV

### SEMICONDUCTORS AND MAGNETIC MATERIALS:

**Semiconductor Physics:** 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, LED, laser diode and photodiode.

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

## UNIT V

### SUPERCONDUCTIVITY AND PHYSICS OF NANOMATERIALS:

**Superconductivity:** Introduction – Meissner effect - Properties of superconductors – Type I and type II superconductors – Flux quantization – London penetration depth – ac and dc Josephson effects – 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, sol-gel, plasma arcing and thermal evaporation – Properties of Carbon nanotubes – High strength applications – Properties of graphene – Graphene based Field Effect Transistor - Applications of nanomaterials.



**Text Books:**

1. *Engineering physics* – S. ManiNaidu, Pearson Education, I Edition, 2012.
2. *Engineering Physics* – V. Rajendran, MacGraw Hill Publishers, I Edition, 2008.

**Reference Books:**

1. *Engineering Physics* – V. Rajendran, K.Thyagarajan Tata MacGraw Hill Publishers, III Edition, 2012.
2. *Engineering Physics* – RV.S.S.N. Ravi Kumar and N.V. Siva Krishna, Maruthi Publications , 2013
3. *Engineering Physics* - Sanjay D. Jain, D. Sahasrambudhe and Girish University Press, I Edition, 2009.
4. *Engineering Physics* – D K Pandey, S. Chaturvedi, Cengage Learning, I Edition, 2012
5. *Engineering Physics* – Hitendra K Mallik and AK Singh, McGraw Hill Education Pvt. Ltd, New Delhi , I Edition, 2010
6. *Engineering Physics* – M. Arumugam, Anuradha Publications II Edition, 1997.
7. *Engineering physics* – M.N. Avadhanulu and P.G. KshirSagar, Chand and Co, Revised Edition, 2013.
8. *Solid State Physics* – A.J. Dekkar, McMillan Publishers, Latest edition, 2012.
9. *Engineering Physics* – Gaur and Gupta Dhanapati, Rai Publishers , 7<sup>th</sup> Edition, 1992.
9. *Text book of Nanoscience and Nanotechnology: B S Murthy, P.Shankar, Baldev Raj B B Rath, James Murday, University Press, I Edition, 2012.*
10. *Carbon Nanotubes and Graphene Device Physics* – H.S. Philip Wong, Deji Akinwande, Cambridge University Press, 2011.

## JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

B.Tech. I Year

Th	Tu	C
2	0	3

Common to All Branches

### (13A51101) 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 depend 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 materials 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 Objective:**

- 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, analytical methods, engineering materials and water chemistry.

#### **Learning Outcome:**

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.

#### **UNIT 1**

##### **ELECTROCHEMISTRY:**

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

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

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

#### **UNIT II**

##### **POLYMERS:**

Introduction to polymers, Polymerisation process, mechanism: cationic, anionic, free radical and coordination covalent, Elastomers (rubbers), Natural Rubber, Compounding of Rubber, Synthetic

Rubber: Preparation, properties and engineering applications of Buna-S, buna-N, Polyurethane, Polysulfide (Thiokol) rubbers. Plastomers: Thermosetting and Thermoplastics, Preparation, properties and Engineering applications, PVC, Bakelite, nylons.

**Conducting polymers:** Mechanism, synthesis and applications of polyacetylene, polyaniline. Liquid Crystals: Introduction, classification and applications.

**Inorganic Polymers:** Basic Introduction, Silicones, Polyphosphazins  $(-R)_2-P=N-$  applications.

### UNIT III

#### FUEL TECHNOLOGY:

Classifications of Fuels – Characteristics of Fuels- Calorific Value – Units, Numerical Problems, Solid Fuels–Coal, Coke : Manufacture of Metallurgical Coke by Otto Hoffmann's by product oven processes.

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

Power Alcohol: Manufacture, Advantages and Disadvantages of Power Alcohol

**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.

### UNIT IV

#### CHEMISTRY OF ENGINEERING MATERIALS:

Semiconducting and Super Conducting materials-Principles and some examples, Magnetic materials – Principles and some examples, Cement: Composition, Setting and Hardening (Hydration and Hydrolysis), Refractories: Classification, properties and applications, Lubricants: Theory of lubrication, properties of lubricants and applications, Rocket Propellants: Classification, Characteristics of good propellant

### UNIT V

#### 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 powder, ozonisation)

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

#### Text Books:

1. *Engineering Chemistry by KNJayaveera, GVSubba Reddy and C. Ramachandraiah, McGraw Hill Higher Education, New Delhi, Fourth Edition, 2012.*
2. *A Text book of Engineering Chemistry by S.S Dhara, S.S.Umare, S. Chand Publications, New Delhi, 12<sup>th</sup> Edition, 2010.*

#### Reference Books:

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

## JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

B.Tech. I Year

Th	Tu	C
3	1	5

### Common to All Branches (13A54101) MATHEMATICS – I

#### Course Objective:

- To train the students thoroughly in Mathematical concepts of ordinary differential equations and their applications in electrical circuits, deflection of beams, whirling of shafts.
- To prepare students for lifelong learning and successful careers using mathematical concepts of differential, Integral and vector calculus, ordinary differential equations and Laplace transforms.
- To develop the skill pertinent to the practice of the mathematical concepts including the student abilities to formulate the problems, to think creatively and to synthesize information.

#### Learning Outcome:

- The students become familiar with the application of differential, integral and vector calculus, ordinary differential equations and Laplace transforms to engineering problems.
- The students attain the abilities to use mathematical knowledge to analyze and solve problems in engineering applications.

#### 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  $e^{ax}$ ,  $\sin ax$ ,  $\cos ax$ , polynomials in  $x$ ,  $e^{ax} V(x)$ ,  $xV(x)$ , 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, Involute 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 1<sup>st</sup> Edition (2010)*

**Reference Books:**

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

## JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

B.Tech. I Year

Th	Tu	C
3	1	5

### (13A05101) PROBLEM SOLVING AND COMPUTER PROGRAMMING

#### **Course Objective:**

- To understand the core aspects of computer problem solving techniques
- To understand the programming language constructs
- To understand the programming paradigms
- To understand the compound data types
- To understand dynamic memory allocation concepts

#### **Learning Outcome:**

- Able to design the flowchart and algorithm for real world problems
- Able to learn and understand new programming languages
- Able to construct modular and readable programs
- Able to write C programs for real world problems using simple and compound data types
- Adapt programming experience and language knowledge to other programming language contexts
- Employ good programming style, standards and practices during program development

#### UNIT I

**Introduction to Computers:** Computer Systems, Computing Environment, Computer Languages, Creating and Running Programs, System Developments.

**Introduction to the C Language:** Introduction, C programs, Identifiers, Types, Variables, Constants, Input and Output, Programming Examples.

**Introduction to Computer Problem Solving:** Introduction, The Problem-Solving Aspect, Top-down Design, Bottom-up Approach, Flowcharts, Implementation of Algorithms, Program Verification, The Efficiency of Algorithms, The Analysis of Algorithms.

#### UNIT II

**Structure of C program:** Expressions, Precedence and Associativity, Evaluating Expressions, Type Conversion, Statements, Sample Programs.

**Selections and Making Decisions:** Logical Data and Operators, Two-way Selection, Multiway Selection.

**Repetition:** Concept of Loop, Pretest and Post-test Loops, Initialization and Updation, Event and Counter Controller Loop, Loops in C, Looping Applications.

**Fundamental Algorithms:** Exchanging the values between two variables, Counting, Summation of a set numbers, Factorial Computation, Sine Function Computation, Generation of the Fibonacci Sequence, Reversing the digits of a integer, Basic conversions, Character to Number Conversion

#### UNIT III

**Factoring Methods:** Finding Square root of a Number, The Smallest Divisor of an Integer, The GCD of two Integers, Generating Prime Numbers, Computing Prime Factor of an Integer, Computing the prime factors of an Integer, Generation of Pseudo Random Number, Raising the number to Large Power, Computing the  $n^{\text{th}}$  Fibonacci.

**Functions:** Introduction, User Defined Functions, Inter-Function Communication, Standard Functions, Scope, Programming Examples.

**Array Techniques:** Array Order Reversal, Array Counting, Finding the Maximum Number Set, Removal Duplicates from an Ordered Array, Partitioning an Array, Finding  $k^{\text{th}}$  smallest Element, Longest Monotone Subsequence.

**Arrays:** Introduction, Two Dimensional Arrays, Multi Dimensional Arrays, Inter Function Communication, Array Applications, Exchange Sort, Binary Search, Linear Search.

## UNIT IV

**Strings:** String Concepts, C Strings, Sting Input/Output Functions, Arrays of Strings, String Manipulation Functions, String/Data Conversion.

**Enumerated, Structure, and Union Types:** The Type Definition, Enumerated Types, Structure, Unions, Programming Applications.

**Bitwise Operators:** Exact Size Integer Types, Logical Bitwise Operators, Shift Operators, Mask.

## UNIT V

**Pointers:** Introduction, Pointers for Inter-Function Communication, Pointers to Pointers, Compatibility, Lvalue and Rvalue.

**Pointer Applications:** Array and Pointers, Pointer Arithmetic and Arrays, Passing an Array to a Function, Memory Allocation Functions, Array of Pointers, Programming Applications.

**Binary Input/output:** Text Versus Binary Streams, Standard Library Functions for Files, Converting File Type.

**Linked List:** Single Linked List, Insertion and Deletion

### **Text Books :**

1. *How to Solve it by Computer* by R.G. Dromey, Pearson
2. *Computer Science, A Structured Programming Approach Using C* by Behrouz A. Forouzan & Richard F. Gilberg, Third Edition, Cengage Learning

### **Reference Books :**

1. *Programming in C: A Practical Approach*, Ajay Mittal, Pearson.
2. *The C programming Language*, B. W. Kernighan and Dennis M. Ritchi, Pearson Education.
3. *Problem Solving and Programming Designs in C*, J. R. Hanly and E.B. Koffman.,
4. *Programming with C* Rema Theraja, Oxford
5. *Problem Solving with C*, M.T.Somashekara, PHI
6. *C Programming with problem solving*, J.A. Jones & K. Harrow, Dreamtech Press
7. *Programming with C*, R.S.Bickar, Universities Press.

## JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

**B.Tech. I Year**  
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### (13A54102) MATHEMATICS – II

#### **Course Objective:**

- *This course aims at providing the student with the concepts of Matrices, Fourier series, Fourier and Z-transforms and partial differential equations which find the applications in engineering.*
- *Our emphasis will be more on logical and problem solving development in Numerical methods and their applications.*

#### **Learning Outcome:**

- *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.*

#### **UNIT I**

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 – Diagonalization of matrix. Calculation of powers of 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.

**Interpolation:** Newton's forward and backward interpolation formulae – Lagrange's Interpolation formula.

Curve fitting: Fitting of a straight line – Second degree curve – Exponential curve-Power curve by method of least squares. Numerical Differentiation and Integration – Trapezoidal rule – 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 z-transforms.

#### **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 5<sup>th</sup> Edition (2012)*

**Reference Books:**

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

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(13A99101) BASIC ELECTRICAL & ELECTRONICS ENGINEERING

**PART- A**

**Course Objective:**

- This course introduces the basic concepts of circuit analysis which is the foundation for all subjects of the Electrical Engineering discipline. The emphasis of this course is laid on the basic analysis of circuits which includes Circuit concepts, Machines etc

**UNIT I**

**Introduction To Electrical Engineering:** Ohm's Law, Basic Circuit Components, Kirchhoff's Laws, Types of Sources, Resistive Networks, Inductive Networks, Capacitive Networks, Series Parallel Circuits, Star Delta and Delta Star Transformation. Principle of AC Voltages, Root Mean Square and Average Values of Alternating Currents and Voltage, Form Factor and Peak Factor, Phasor Representation of Alternating Quantities, The J Operator and Phasor Algebra, Analysis of Ac Circuits With Single Basic Network Element, Single Phase Series and Parallel Circuits

**UNIT II**

**Network Theorems:** Thevenin's, Norton's, Maximum Power Transfer and Millman's Theorems for D.C and Sinusoidal Excitations. Tellegen's, Superposition, Reciprocity and Compensation Theorems for D.C And Sinusoidal Excitations.

**Two Port Networks:** Two Port Network Parameters – Impedance, Admittance, Transmission and Hybrid Parameters and Their Relations. Concept of Transformed Network - Two Port Network Parameters Using Transformed Variables

**UNIT III Rotating Machines**

**D.C. Generators:** Principles of Operation –Constructional Details-Expression for Generated EMF- Applications of D.C.Generators.

**D.C. Motors:** Principles of Operation –Constructional Details-Back EMF- Armature Torque of a D.C. Motor - Characteristics of D.C. Motors -Applications of D.C.Motors

**Induction Motors:** Introduction to 3-Phase Induction Motor- Principle of Operation- Constructional Details – Slip- Expression for Torque -Torque-Slip Characteristics- Applications of 3 Phase Induction Motors.

**PART-B**

**Course Objective:**

- *The objective of this Course is to provide the students with an introductory and broad treatment of the field of Electronics Engineering.*

**UNIT IV**

**Semiconductor Devices:** Intrinsic semiconductors-Electron-Hole Pair Generation, Conduction in Intrinsic Semiconductors, Extrinsic Semiconductors-N-Type and P-Type Semiconductors, Comparison of N-Type and P-Type Semiconductors. The p-n Junction - Drift and Diffusion Currents, The p-n Junction Diode-Forward Bias, Reverse Bias, Volt-Ampere Characteristics- Diode Specifications, Applications of Diode, Diode as a Switch. Diode as a Rectifier-Half-wave Rectifier, Full-Wave Rectifier, Full-Wave Bridge Rectifier, Rectifiers with Filters, Zener Diode- Volt-Ampere Characteristics, Zener Diode as Voltage Regulator.

**UNIT V**

**BJT and FETs:** Bipolar Junction Transistor (BJT) – Types of Transistors, Operation of NPN and PNP Transistors, Input-Output Characteristics of BJT-CB, CE and CC Configurations, Relation between  $I_C$ ,  $I_B$  and  $I_E$ . Transistor Biasing- Fixed Bias, Voltage Divider Bias, Transistor Applications- Transistor as an Amplifier,

Transistor as a Switch,. Junction Field Effect Transistor (JFET)- Theory and Operation of JFET, Output Characteristics, Transfer Characteristics, Configurations of JFET-CD, CS and CG Configurations, JFET Applications- JFET as an Amplifier, JFET as a Switch, Comparison of BJT and JFET,MOSFET-The Enhancement and Depletion MOSFET, Static Characteristics of MOSFET, Applications of MOSFET

## **UNIT VI**

**Oscillators and Op-Amps:** Sinusoidal Oscillators, Barkhausen Criteria for Oscillator Operation, Components of an Oscillator-Transistor Amplifier Circuits, Feedback Circuits and Oscillator Circuits, Classification of Oscillators, LC Tuned, RC Phase Shift Oscillator circuits.

**Operational Amplifiers(Op-Amps)**-Symbol of an Op-Amp, single Input and Dual Input Op-Amps(Differential Amplifier), Characteristics of an Ideal Op-Amp, Basic Forms of Op-Amps-Inverting & Non-Inverting Amplifiers, Applications of Op-Amps, summing, Differential, Integrator, differentiator Amplifier.

### **Text Books:**

1. *Basic Electrical Engineering* by D P KOTHARI & I J NAGRATH, Tata McGraw Hill, Second Edition, 2007.
2. *Electrical Circuit Theory and Technology* by JOHN BIRD, Routledge publisher, 4<sup>Th</sup> Edition, 2011.
3. *Basic Electrical and Electronics Engineering*, M.S.Sukhija, T.K.Nagsarkar, Oxford University Press, 1<sup>st</sup> Edition, 2012.
4. *Basic Electrical and Electronics Engineering*, S.K Bhattacharya, Pearson Education, 2012.

### **Reference Books :**

1. *Electrical & Electronic Technology* by Edward Hughes, 10<sup>th</sup> Edition, Pearson, 2008
2. "Basic Electrical Engineering", Uma Rao, Sanguine-Pearson.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

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(13A05102) COMPUTER PROGRAMMING LAB

- Week-1**
- 1) Write an algorithm and draw a flowchart to make the following exchange between the variables  
a-> b -> c->d -> a
  - 2) Write an algorithm and draw a flowchart to generate the first n terms of the sequence.  
A Fibonacci sequence is defined as follows: the first and second terms in the sequence are 0 and 1. Subsequent terms are found by adding the preceding two terms in the sequence.

- Week-2**
- 1) Write an algorithm and draw a flowchart to carry out the arithmetic operations addition, subtraction, multiplication, and division between two variables
  - 2) Write an algorithm and draw a flowchart for printing prime numbers between 1 and n.

- Week-3**
- 1) The packing department of a television set manufacturer has to prepare a requisition note listing the number of different boxes required for the different TV models that it has received from the production department. The list prepared has to be forwarded to the stores department so that the required boxes are issued to the packing department. The category and the number of boxes required for each type of TV model is given as follows:

- 2) Write a program that reads 10 integers and prints the first and last on one line, the second and the ninth on the next line, the third and the seventh on the next line, and so forth. Sample input and the results are shown below.

*Please enter 10 numbers :*  
10 31 2 73 24 65 6 87 18 9

*Your numbers are :*

10 9  
31 18  
2 87  
73 6  
24 65

- Week-4**
- 1) Write a program that prompts the user to enter an integer and then prints the integer first as a character and then as a decimal and finally as a float. Use separate print statements.

*Expected output*

*The number as a character : K*  
*The number as a decimal : 75*  
*The number as a float : 0.000000*

- 2) Write a program to read two floating point numbers add these two numbers and assign the result to an integer. Finally display the value of all the three variables.
- 3) Write a program to demonstrate the results obtained by using the increment and decrement operators(++ , --) along-with logical operators(&&, ||) on operands

- Week-5**
- 1) Write a program to demonstrate the results obtained by using the arithmetic operators for addition, subtraction, multiplication and division on integer data.
  - 2) Write a program to evaluate the following expression

$$Y = 1 + \frac{-1^2}{2} + \frac{-3^2}{2} + \sqrt{\cos^2(2)}$$

- Week-6**
- 1) Write a C program to construct a multiplication table for a given number.
  - 2) Write a program to reverse the digit of a given integer.
  - 3) Write a C program to calculate the factorial of a given number

- Week-7** Write a program to calculate tax, given the following conditions:
- a) If income is less than 1,50,000 then no tax.
  - b) If taxable income is in the range 1,50,001 – 300,000 then charge 10% tax
  - c) If taxable income is in the range 3,00,001 – 500,000 then charge 20% tax
  - d) If taxable income is above 5,00,001 then charge 30% tax

- Week-8** 1) Write a program to print the calendar for a month given the first Week- day of the month.

Input the first day of the month (Sun=0,Mon=1,Tue=2,Wed=3,.....) :: 3  
 Total number of days in the month : 31

Expected output

Sun	Mon	Tue	Wed	Thu	Fri	Sat
-	-	-	1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
25	26	27	28	29	30	31

- Week-9**
- 1) Write a program to print the Pascal triangle for a given number
  - 2) Write a program to calculate the following expression for given x value

$$\frac{1}{x} + \frac{1}{x^2} + \frac{1}{x^3} + \dots + \frac{1}{x^n}$$

- Week-10**
1. Write C code to define a function, median, that takes 3 numbers as its inputs, and returns the median.
  2. Write a function to find the sum of the digit of a given number
  3. Write a program to perform simple calculator operations(use functions: addition, subtraction, multiplication and division)

- Week-11**
- 1) Write C code to define a function cash\_dispense, which takes an amount as its input, and returns the number of 1000, 500, 100, 50, 20, 10, 5, 2, 1 rupee denomination that make up the given amount.
  - 2) Write C code to reverse the contents of the array. For example, [1,2,3,4,5] should become [5,4,3,2,1]
  - 3) Write a program that will search and find out the position where the given key element exist in a user chosen array and print it as output.

- Week-12**
- 1) Write a program that uses the binary search algorithm to find out the position where the given key element exist in a user chosen array and print it as output
  - 2) Write a program perform matrix multiplication between two matrices.
- Week-13**
- 1) Write C code to compute the frequency table of survey responses given by 20 users. The survey responses range from 1 to 5 and are stored in an array. For example, 10 responses are stored in the array [1,1,5,2,3,3,5,5,2,2]. The frequency table will be as shown below:
    - a. 1 = 2
    - b. 2 = 3
    - c. 3 = 2
    - d. 4 = 0
    - e. 5 = 3
  - 2) Write a program to define a function to sort an array of integers in ascending order by using exchange sort.
- Week-14**
- 1) Write a c program to define a function to find the largest and smallest numbers in list of integers.
  - 2) Write a C program that uses a recursive function for generating the Fibonacci numbers.
- Week-15**
- 1) Write a C program to check whether a given string is a palindrome or not, without using any built-in functions
  - 2) Write a function that accepts a string and delete the first character.
  - 3) Write a function that accepts a string and delete all the leading spaces.
- Week-16** Write a program to accept a string from user and display number of vowels, consonants, digits and special characters present in each of the words of the given string.
- Week-17** Write a C program that uses functions to perform the following operations:
- a) Reading a complex number
  - b) Writing a complex number
  - c) Addition of two complex numbers
  - d) Multiplication of two complex numbers
- (Note: represent complex numbers using structures)
- Week-18**
- 1) Write a C program to define a union and structure both having exactly the same numbers using the sizeof operators print the sizeof structure variables as well as union variable
  - 2) Declare a structure *time* that has three fields *hr*, *min*, *secs*. Create two variables, *start\_time* and *end\_time*. Input there values from the user. Then while *start\_time* is not equal to *end\_time* display GOOD DAY on screen.
- Week-19**
- 1) Write a function that flips the bits in an 16-bit unsigned integer.
  - 2) Write a function that changes the first(leftmost) hexadecimal digit in a 32-bit unsigned integer. The function is to have two parameters. The first is the integer to be manipulated, the second the replacement digit.
- Week-20**
- 1) Write a program to read in an array of names and to sort them in alphabetical order. Use sort function that receives pointers to the functions strcmp, and swap, sort in turn should call these functions via the pointers.
  - 2) Write a program to read and display values of an integer array. Allocate space dynamically for the array using the *malloc()*.

- Week-21** Write a program to calculate area of a triangle using function that has the input parameters as pointers as sides of the triangle.
- Week-22**
- 1) Two text files are given with the names text1 and text2. These files have several lines of text. Write a program to merge (first line of text1 followed by first line of text2 and so on until both the files reach the end of the file) the lines of text1 and text2 and write the merged text to a new file text3.
  - 2) Write a program to split a given text file into n parts. Name each part as the name of the original file followed by .part<n> where n is the sequence number of the part file.
- Week-23** Write a program in C using structures which stores the code, name and price of an item stored in a file and perform the following operations:
- a) Append item
  - b) Modify an item
  - c) Display all items
  - d) Delete n item
- Week-24** 1) Write a program that uses the functions to perform the following operations on a single linked list
- a. Creation
  - b. Insertion
  - c. Deletion
  - d. Traversal

**Reference Books:**

1. *Computer Science, A Structured Programming Approach Using C* by Behrouz A. Forouzan & Richard F. Gilberg, Third Edition, Cengage Learning
2. *C Programming A Problem-Solving Approach*, Behrouz A. Forouzan & E.V. Prasad, F. Gilberg, Third Edition, Cengage Learning
3. *Programming with C* Rema Theraja, Oxford
4. *"C Test Your Skills"*, Kamthane, Pearson Education
5. *Programming in C: A Practical Approach*, Ajay Mittal, Pearson
6. *Problem solving with C*, M.T.Somasekhara, PHI
7. *C Programming with problem solving*, J.A. Jones & K. Harrow, Dreamtech Press
8. *Programming with C*, Byron S Gottfried, Jitender Kumar Chhabra, TMH, 2011

## JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

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### **Common to All Branches (13A99102) ENGINEERING PHYSICS & ENGINEERING CHEMISTRY LAB**

#### **ENGINEERING PHYSICS LAB**

#### **LIST OF EXPERIMENTS**

##### **Any 10 of the following experiments has to be performed:**

1. Determination of wavelengths of various colours of mercury spectrum using diffraction grating in normal incidence method
2. Determination of dispersive power of the prism
3. Determination of thickness of thin object by wedge method
4. Determination of radius of curvature of lens by Newton's Rings
5. Laser : Diffraction due to single slit
6. Laser : Diffraction due to double slit
7. Laser: Determination of wavelength using diffraction grating
8. Determination of Numerical aperture of an optical fiber
9. Melde's experiment: Determination of the frequency of tuning fork
10. Sonometer: Verification of the three laws of stretched strings
11. Energy gap of a material using p-n junction diode
12. Electrical conductivity by four probe method
13. Determination of thermistor coefficients ( $\alpha$ ,  $\beta$ )
14. Hall effect : Determination of mobility of charge carriers in semiconductor
15. B-H curve
16. Magnetic field along the axis of a current carrying coil – Stewart and Gee's method.
17. Determination of lattice constant using X-ray spectrum.

#### **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 feel good factor at the laboratory bench about the chemical principles that he/she learned in the classroom.*

##### **Course 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

##### **Learning Outcome:**

- 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.*

#### **LIST OF EXPERIMENTS**

**Any 10 of the following experiments has to be performed:**

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 Copper by Iodometry
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 Chromite indicator (Mohrs method)

#### **References:**

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, 3<sup>rd</sup> Edition, 2012.*

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**Common to All Branches**

**(13A99103) ENGINEERING & I.T. WORKSHOP**

**ENGINEERING WORKSHOP**

**Course Objective:**

*The budding Engineer may turn out to be a technologist, scientist, entrepreneur, practitioner, consultant etc. There is a need to equip the engineer with the knowledge of common and newer engineering materials as well as shop practices to fabricate, manufacture or work with materials. Essentially he should know the labour involved, machinery or equipment necessary, time required to fabricate and also should be able to estimate the cost of the product or job work. Hence engineering work shop practice is included to introduce some common shop practices and on hand experience to appreciate the use of skill, tools, equipment and general practices to all the engineering students*

**1. TRADES FOR EXERCISES:**

- a. Carpentry shop– Two joints (exercises) involving tenon and mortising, groove and tongue: Making middle lap T joint, cross lap joint, mortise and tenon T joint, Bridle T joint from out of 300 x 40 x 25 mm soft wood stock
- b. Fitting shop– Two joints (exercises) from: square joint, V joint, half round joint or dove tail joint out of 100 x 50 x 5 mm M.S. stock
- c. Sheet metal shop– Two jobs (exercises) from: Tray, cylinder, hopper or funnel from out of 22 or 20 guage G.I. sheet
- d. House-wiring– Two jobs (exercises) from: wiring for ceiling rose and two lamps (bulbs) with independent switch controls with or without looping, wiring for stair case lamp, wiring for a water pump with single phase starter.
- e. Foundry– Preparation of two moulds (exercises): for a single pattern and a double pattern.
- f. Welding – Preparation of two welds (exercises): single V butt joint, lap joint, double V butt joint or T fillet joint.

**2. TRADES FOR DEMONSTRATION:**

- a. Plumbing
- b. Machine Shop
- c. Metal Cutting

Apart from the above the shop rooms should display charts, layouts, figures, circuits, hand tools, hand machines, models of jobs, materials with names such as different woods, wood faults, Plastics, steels, meters, gauges, equipment, CD or DVD displays, First aid, shop safety etc. (though they may not be used for the exercises but they give valuable information to the student). In the class work or in the examination knowledge of all shop practices may be stressed upon rather than skill acquired in making the job.

**References:**

1. *Engineering Work shop practice for JNTU, V. Ramesh Babu, VRB Publishers Pvt. Ltd., 2009*
2. *Work shop Manual / P.Kannaiah/ K.L.Narayana/ SciTech Publishers.*
3. *Engineering Practices Lab Manual, Jeyapoovan, SaravanaPandian, 4/e Vikas*
4. *Dictionary of Mechanical Engineering, GHF Nayler, Jaico Publishing House.*

## **I.T. WORKSHOP**

### **Course Objective:**

- *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.*

### **Learning Outcome:**

- *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. Crimping 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, and 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 color, 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, colors, 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. *MOS study guide for word, Excel, Powerpoint & Outlook Exams*”, Joan Lambert, Joyce Cox, PHI.
3. *Introduction to Information Technology*, ITL Education Solutions limited, Pearson Education.
4. *Networking your computers and devices*, Rusen, PHI
5. *Trouble shooting, Maintaining & Repairing PCs*”, Bigelows, TMH

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR**

**B.Tech. I Year**

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3      4

**Common to All Branches  
(13A52102) ENGLISH LANGUAGE COMMUNICATION SKILLS (ELCS) 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.

**Course Objective:**

- *To train students to use language effectively in everyday conversations.*
- *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*

**Learning Outcome:**

- *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*

**PHONETICS**

Importance of speaking phonetically correct English  
Speech mechanism-Organs of speech  
Uttering letters-Production of vowels sounds  
Uttering letters -Production of consonant sounds  
Uttering words-Stress on words and stress rules  
Uttering sentences-Intonation-tone group

**LISTENING**

Listening as a skill  
Listening activities

**PRESENTATIONAL SKILLS**

Preparation  
Prepared speech  
Impromptu speech  
topic originative techniques  
JAM (Just A Minute)  
Describing people/object/place  
Presentation-  
Stage dynamics  
Body language

**SPEAKING SKILLS**

Telephone skills  
Role plays  
Public Speaking

**GROUP ACTIVITIES**

Debates  
Situational dialogues

### **MINIMUM REQUIREMENT FOR ELCS LAB:**

The English Language Lab shall have two parts:

#### **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.
- 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:
  - P – IV Processor
  - Speed – 2.8 GHZ
  - RAM – 512 MB Minimum
  - Hard Disk – 80 GB
  - Headphones of High quality

#### **SUGGESTED SOFTWARE:**

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

#### **References:**

1. *Strengthen Your Steps*, Maruthi Publicaions, 2012.
2. *A Course in Phonetics and Spoken English*, [Dhamija Sethi](#), Prentice-Hall of India Pvt.Ltd.
3. *A Textbook of English Phonetics for Indian Students 2<sup>nd</sup> Ed* T. Balasubramanian. (Macmillian),2012.
4. *Speaking English Effectively*, 2<sup>nd</sup> 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.
10. *English Pronouncing Dictionary*, Daniel Jones, Current Edition with CD.Cambridge, 17<sup>th</sup> edition, 2011.

## JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

B.Tech. II - I Sem.

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### (13A03304) ENGINEERING GRAPHICS

#### 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, Epicycloid and Hypocycloid

#### UNIT II

**Projection of Points & Lines:** Principles of orthographic projection – Convention – First angle projections, projections of points, lines inclined to one or both planes, Problems on projections, Finding True lengths.

#### UNIT III

**Projections of Planes:** Projections of regular plane surfaces- plane surfaces inclined to one plane.  
**Projections of Solids:** Projections of Regular Solids with axis inclined to one plane.

#### UNIT IV

**Sections and Developments of Solids:** Section Planes and Sectional View of Right Regular Solids- Prism, cylinder, Pyramid and Cone. True shapes of the sections. Development of Surfaces of Right Regular Solids-Prism, Cylinder, Pyramid, Cone.

#### UNIT V

**Isometric and Orthographic Projections:** Principles of isometric projection- Isometric Scale- Isometric Views- Conventions- Isometric Views of lines, Planes Figures, Simple solids (cube, cylinder and cone). Isometric projections of spherical parts. Conversion of isometric Views to Orthographic Views.

#### Text Books:

1. *Engineering Drawing*, N.D. Bhatt, 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*, B.V.R. Guptha, J.K. Publishers



**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 introduction for drawing can be had on line from:*
  - *Introduction to engineering drawing with tools – youtube*
  - *Http-sewor. Carleton.ca /- g kardos/88403/drawing/drawings.html*
  - *Conic sections-online. red woods.edu*

*The skill acquired by the student in this subject is very useful in conveying his ideas to the layman easily.*

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR**

**B.Tech. II - I Sem.**

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**(13A54303) PROBABILITY AND STATISTICS**

**Course Objective:**

- *To help the students in getting a thorough understanding of the fundamentals of probability and usage of statistical techniques like testing of hypothesis, ANOVA, Statistical Quality Control and Queuing theory*

**Learning Outcome:**

- *The student will be able to analyze the problems of engineering & industry using the techniques of testing of hypothesis, ANOVA, Statistical Quality Control and Queuing theory and draw appropriate inferences*

**UNIT I**

Conditional probability – Baye’s theorem. Random variables – Discrete and continuous Distributions – Distribution functions. Binomial and poison distributions Normal distribution – Related properties.

**UNIT II**

Test of Hypothesis: Population and Sample - Confidence interval of mean from Normal distribution - Statistical hypothesis - Null and Alternative hypothesis - Level of significance - Test of significance - Test based on normal distribution - Z test for means and proportions; Small samples - t- test for one sample and two sample problem and paired t-test, F-test and Chi-square test (testing of goodness of fit and independence).

**UNIT III**

Analysis of variance one way classification and two way classification (Latic square Design and RBD)

**UNIT IV**

Statistical Quality Control: Concept of quality of a manufactured product -Defects and Defectives - Causes of variations - Random and assignable - The principle of Shewhart Control Chart-Charts for attribute and variable quality characteristics- Constructions and operation of X- bar Chart, R-Chart, P-Chart and C-Chart.

**UNIT V**

Queuing Theory: Pure Birth and Death process, M/M/1 & M/M/S & their related simple problems.

**Text Books:**

1. *Probability & Statistics for engineers by Dr. J. Ravichandran WILEY-INDIA publishers.*
2. *Probability & Statistics by T.K.V. Iyengar, S.Chand publications.*

**Reference Books:**

1. *Probability & Statistics by E. Rukmangadachari & E. Keshava Reddy, Pearson Publisher.*
2. *Statistical methods by S.P. Gupta, S.Chand publications.*
3. *Probability & Statistics for Science and Engineering by G.Shanker Rao, Universities Press.*
4. *Probability and Statistics for Engineering and Sciences by Jay L.Devore, CENGAGE.*
5. *Probability and Statistics by R.A. Jhonson and Gupta C.B.*

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**(13A01403) ENVIRONMENTAL SCIENCE**

**Course Objective:**

- *To make the students to get awareness on environment, to understand the importance of protecting natural resources, ecosystems for future generations and pollution causes due to the day to day activities of human life to save earth from the inventions by the engineers.*

**UNIT I**

**MULTIDISCIPLINARY NATURE OF ENVIRONMENTAL STUDIES:** – Definition, Scope and Importance – Need for Public Awareness.

**NATURAL RESOURCES :** 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:** 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)

**BIODIVERSITY AND ITS CONSERVATION:** 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:** 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

**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. – 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 V**

**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.

**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 by Erach Bharucha for University Grants Commission, Universities Press, 2005.*
2. *Environmental Studies by Palanisamy, Pearson education, 2012.*
3. *Environmental Studies by R.Rajagopalan, Oxford University Press, 2<sup>nd</sup> edition, 2011.*

##### **Reference Books:**

1. *Textbook of Environmental Studies by Deeksha Dave and E.Sai Baba Reddy, Cengage Publications, 2<sup>nd</sup> edition, 2012.*
2. *Text book of Environmental Science and Technology by M.Anji Reddy, BS Publication, 2009.*
3. *Comprehensive Environmental studies by J.P.Sharma, Laxmi publications, 2<sup>nd</sup> edition, 2006.*
4. *Environmental sciences and engineering – J. Glynn Henry and Gary W. Heinke – Printice hall of India Private limited, 2<sup>nd</sup> edition, 1996.*
5. *Introduction to Environmental engineering and science by Gilbert M. Masters and Wendell P. Ela - Printice hall of India Private limited, 3<sup>rd</sup> edition, 2007.*

## JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

B.Tech. II - I Sem.

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3	1	3

### (13A05301) DATA STRUCTURES

#### **Course Objective:**

- To develop skills to design and analyze linear and non linear data structures.
- Develop algorithms for manipulating linked lists, stacks, queues, trees and graphs.
- Develop recursive algorithms as they apply to trees and graphs.
- To develop a base for advanced computer science study.

#### **Learning Outcome:**

At the end of the course students will be assessed to determine whether they are able to

- Study variety of advanced abstract data type (ADT) and data structures and their Implementations.
- Identify and apply the suitable data structure for the given real world problem

#### **UNIT I**

**Introduction and Overview:** System Life Cycle, Definition, Overview of Data Structures

**Linked Lists:** Single Linked Lists – Insertion and Deletion, Double Linked Lists – Insertion and Deletion.

**Stacks:** Definition, The Abstract Data Type, Array Representation, Linked Representation, Applications.

**Queues:** Definition, The Abstract Data Type, Array Representation, Linked Representation, Circular Queues, Applications.

#### **UNIT II**

**Sorting:** Motivation, Quick Sort, Merge Sort, Insertion Sort, and Heap Sort.

**Trees:** Introduction, Representation of Trees, Binary Trees, Binary Tree Traversal and Tree Iterators, Additional Binary Tree Operations, Threaded Binary Trees, Binary Search Trees, Selection Trees.

#### **UNIT III**

**Graphs:** The Graph Abstract Data Type, Elementary Graph Operations.

**Skip Lists and Hashing:** Dictionaries, Linear List Representation, Skip List Representation, Hash Table Representation, Static and Dynamic Hashing.

#### **UNIT IV**

**Priority Queues:** Definition and Applications, Single and Double Ended Priority Queues, Linear Lists, Heaps, Leftist Trees, Binomial Heaps, Fibonacci Heaps, Pairing Heaps.

#### **UNIT V**

**Efficient Binary Search Trees:** Optimal Binary Search Trees, AVL Trees, Red – Black Trees, Splay Trees.

**Multiway Search Trees:** m – way Search Trees, B – Trees, B<sup>+</sup> - Trees

#### **Text Books:**

1. *Fundamentals of Data Structures in C++* by Ellis Horowitz, Sartaj Sahni, Dinesh Mehta, Universities Press, Second Edition.
2. *Data Structures, Algorithms and Applications in C++* by Sartaj Sahni, Universities Press, Second Edition

**Reference Books:**

1. *Data Structures and Algorithms Using C++* by Ananda Rao Akepogu and Radhika Raju Palagiri, Pearson Ed.
2. *Classic Data Structure* by D. Samanta, Eastern Economy Edition.
3. *Data Structures and Algorithms Made Easy* by Narasimha Karumanchi, Second Edition, Written in C/C++, CareerMonk Publications, Hyderabad
4. *ADTs, Data Structures and Problem Solving with C++*, Larry Nyhoff, Pearson
5. *Data Structures using C++*, D.S.Malik, 2<sup>nd</sup> Edition, Cengage Learning
6. *Data Structures through C++*, Yashavant P.Kanetkar, BPB Publication
7. *Data Structures using C and C++*, Yedidyah Langsam.Moshe J.Augenstein Aaron M.Tenenbaum, 2<sup>nd</sup> Edition, PHI
8. *Data Structures using C & C++*, Rajesh K.Shukla, Wiley-India

## JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

B.Tech. II - I Sem.

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### (13A04306) DIGITAL LOGIC DESIGN

#### **Course Objective:**

- Acquire the skills to manipulate and examine Boolean algebraic expressions, logical operations, Boolean functions and their simplifications.
- Understand the fundamental principles of digital design.
- Acquaint with classical hardware design for both combinational and sequential logic circuits.

#### **Learning Outcome:**

- Ability to interpret, convert and represent different number systems and binary arithmetic.
- Able to design sequential and combinational circuits
- Able to design different units of a digital computer.

#### **UNIT I**

**Binary Systems:** Digital Systems, Binary Numbers, Number Base Conversions, Octal and Hexadecimal Numbers, Compliments, Signed Binary Numbers, Binary Codes, Binary Storage and Registers, Binary Logic.

**Boolean Algebra And Logic Gates:** Basic Definitions, Axiomatic Definition of Boolean Algebra, Basic Theorems and properties of Boolean Algebra, Boolean Functions, Canonical and Standard Forms, Other Logic Operations, Digital Logic Gates, Integrated Circuits

#### **UNIT II**

**Gate – Level Minimization:** The Map Method, Four Variable Map, Five-Variable Map, Product of Sums Simplification, Don't-Care Conditions, NAND and NOR Implementation, Other Two Level Implementations, EX-OR Function, Other Minimization Methods

#### **UNIT III**

**Combinational Logic:** Combinational Circuits, Analysis Procedure, Design Procedure, Binary Adder-Subtractor, Decimal Adder, Binary Multiplier, Magnitude Comparator, Decoders, Encoders, Multiplexers

#### **UNIT IV**

**Synchronous Sequential Logic:** Sequential Circuits, Latches, Flip-Flops, Analysis of Clocked Sequential Circuits, State Reduction and Assignment, Design Procedure, Registers, Shift Registers, Ripple Counters, Synchronous Counters, Other counters

#### **UNIT V**

**Memory And Programmable Logic:** Random access memory, memory decoding, Error Detection and Correction, Read-only Memory, Programmable Logic Array, Programmable Array Logic.

**Digital Logic Circuits:** RTL and DTL Circuits, Transistor-Transistor Logic (TTL), Emitter-Coupled Logic (ECL), MOS, CMOS Logic, Comparisons of Logic Families

#### **Text Books:**

1. *Digital Design, M.Morris Mano, Micheal D. Ciletti, 5<sup>th</sup> Edition, 2013, Pearson.*

**Reference Books:**

1. *Digital Logic & State Machine Design*, David J. Comer, Oxford University Press, 3<sup>rd</sup> Reprinted Indian Edition, 2012
2. *Digital Logic Design*, R.D. Sudhakar Samuel, Elsevier
3. *Fundamentals of Logic Design*, 5/e, Roth, Cengage
4. *Switching and Finite Automata Theory*, 3/e, Kohavi, Jha, Cambridge.
5. *Digital Logic Design*, Leach, Malvino, Saha, TMH
6. *Modern Digital Electronics*, R.P. Jain, TMH



## JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

B.Tech. II - I Sem.

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### (13A05302) DISCRETE MATHEMATICS

#### Course Objective:

- Understand the methods of discrete mathematics such as proofs, counting principles, number theory, logic and set theory.
- Understand the concepts of graph theory, binomial theorem, probability distribution function in analysis of various computer science applications.

#### Learning Outcome:

- Able to apply mathematical concepts and logical reasoning to solve problems in different fields of Computer science and information technology.
- Able to apply the concepts in courses like Computer Organization, DBMS, Analysis of Algorithms, Theoretical Computer Science, Cryptography, Artificial Intelligence, etc.,

#### UNIT I

**The Language of Logic:** Propositions, Logical Equivalences, Quantifiers, Arguments, Proof Methods.

**The Language of Sets:** The Concepts of a Set, Operations with Sets, Computer Operations with Sets, The Cardinality of a Set, Recursively Defined Sets.

**Functions:** The concept of Functions, Special Functions, Properties of Functions, The Pigeonhole principle, Composite Functions, Sequences and the Summation Notation.

#### UNIT II

**Relations:** Boolean Matrices, Relations and Digraphs, Computer Representations of Relations, Properties of Relations, Operations on Relations, Transitive Closure, Equivalence Relations, Partial and Total Ordering.

**Lattices & Boolean Algebra:** Lattices as Partially Ordered Sets, Properties of Lattices, Lattices as Algebraic Systems, Sublattices, Direct Product and Homomorphism, Boolean Algebra, Boolean Functions

#### UNIT III

**Algebraic Structures:** Algebraic Systems, Semigroups and Monoids, Groups - Subgroups and Homomorphism, Cosets and Lagrange's theorem, Normal Subgroups.

**Combinatorics:** The Fundamental Counting Principles, Permutations, Derangements, Combinations, Permutations and Combinations with Repetitions, The Binomial Theorem, The Generalized Inclusion-Exclusion Principle.

#### UNIT IV

**Induction and Algorithms:** The Division Algorithm, Divisibility Properties, Nondecimal Bases, Mathematical Induction, Algorithm Correctness, The Growth Functions, Complexity of Algorithms.

**Recursion:** Recursively Defined Functions, Solving Recurrence Relations, Generating Functions, Recursive Algorithms, Correctness of Recursive Algorithms, Complexities of Recursive Algorithms.

#### UNIT V

**Graphs:** Computer Representation of Graphs, Isomorphic Graphs, Paths, Cycles, and Circuits, Eulerian and Hamiltonian Graphs, Planar Graphs, Graph Coloring, Digraphs, Dags, Weighted Digraphs, DFS and BFS Algorithms.

**Trees:** Trees, Spanning Trees, Minimal Spanning Trees, Kruskal's and Prim's Algorithm

#### Text Books:

1. *Discrete Mathematics with Applications*, Thomas Koshy, 2003, Elsevier Academic Press.
2. *Discrete Mathematical Structures with Applications to Computer Science*, J.P. Tremblay and R. Manohar, 1975, TMH.

**Reference Books:**

1. *Discrete and Combinatorial Mathematics, Fifth Edition, R. P. Grimaldi, B.V. Ramana, Pearson*
2. *Discrete Mathematics Theory and Applications, D.S Malik and M.K. Sen, Cengage Learning*
3. *J .L.Mott, A.Kandel, T.P .Baker, Discrete Mathematics for Computer Scientists and Mathematicians, second edition 1986, Prentice Hall of India*
4. *C.L.Liu, Elements of Discrete Mathematics, Second Edition 1985, McGraw-Hill Book Company. Reprinted 2000*
5. *Discrete Mathematics, Norman L. Biggs, Second Edition, OXFORD Indian Edition.*
6. *K.H.Rosen, Discrete Mathematics and applications, 5<sup>th</sup> Edition 2003, TataMcGraw Hillpublishing Company*
7. *Graph Theory with Applications to Engineering & Computer Science: Narsingh Deo, PHI (2004)*
8. *“Discrete Mathematical Structures” Jayant Ganguly, Sanguine*

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**B.Tech. II - I Sem.**

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**3      2**

**(13A99304) ELECTRICAL & ELECTRONICS ENGINEERING LAB**

**PART- A: ELECTRICAL LAB**

1. Verification of Superposition Theorem.
2. Verification of Thevenin's Theorem.
3. Open Circuit Characteristics of D.C.Shunt Generator.
4. Swinburne's Test on DC Shunt Machine (Predetermination of Efficiency of a Given DC Shunt Machine Working as Motor and Generator).
5. Brake Test on DC Shunt Motor. Determination of Performance Characteristics.
6. OC & SC Tests on Single-Phase Transformer (Predetermination of Efficiency and Regulation at Given Power Factors).

**PART- B : ELECTRONICS LAB**

**(Any Six Experiments)**

1. P-N Junction Diode and Zener Diode Volt-Ampere Characteristics.
2. Bipolar Junction Transistor in CB Configuration-Input and Output Characteristics, Computation of  $\alpha$ .
3. Half-Wave Rectifier- a) Without Filter b) With Capacitor Filter.
4. Full-Wave Rectifier- a) Without Filter b) With Capacitor Filter.
5. Bipolar Junction Transistor in CE Configuration-Input and Output Characteristics, Computation of  $\beta$ .
6. Junction field effect Transistor in Common Source Configuration Output and Transfer Characteristics.
7. Verification of Logic Gates- AND, OR, NOT, NAND, NOR, EX-OR, EX-NOR.

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR**

**B.Tech. II - I Sem.**

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**(13A05303) DATA STRUCTURES LAB**

Week 1

- a) Write a Program to Implement Stack Operations by using Array and Linked Lists.
- b) Write a Program to Implement the Operations of Double Linked Lists

Week 2

- a) Write a C program that uses stack operations to convert a given infix expression into its postfix
- b) Write a Program to Implement Queue Operations by using Array and Linked Lists.

Week 3

Write a Program to Implement Circular Queue Operations by using Array and Linked Lists.

Week 4

Write a Program to Sort the set of elements by using  
i) Quick Sort    ii) Heap Sort.    iii) Merge Sort

Week 5

Write a Program to Implement the Binary Search Tree Operations.

Week 6

Write a Program to Perform the Tree Traversal Techniques by using the Iterative Method

Week 7

Write C programs for implementing the following graph traversal algorithms: a)Depth first traversal b)Breadth first traversal

Week 8

Write a Program to Implement All functions of a Dictionary by using Hashing

Week 9

Write a Program to Implement Skip List Operations.

Week 10

Write a Program to Implement Insertion, Deletion and Search Operations on SPLAY Trees.

Week 11

Write a program to Implement Insertion and Deletion Operations on AVL Trees

Week 12

Write a Program to Implement Insertion and Deletion Operations on B – Trees

**Note: Use Classes and Objects to implement the above programs.**

**References:**

1. *Object Oriented Programming with ANSI & Turbo C++, Ashok N.Kamthane, Pearson Education*
2. *Data Structures using C++, D.S.Malik, 2<sup>nd</sup> Edition, Cengage Learning*
3. *Data Structures through C++, Yashavant P.Kanetkar, BPB Publication*
4. *Data Structures using C and C++, Yedidyah Langsam.Moshe J.Augenstein Aaron M.Tenenbaum, 2<sup>nd</sup> Edition, PHI*
5. *Data Structures using C & C++, Rajesh K.Shukla, Wiley-India*
6. *ADTs, Data Structures and Problem Solving with C++, Larry Nyhoff, Pearson*

## JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

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### (13A05401) COMPUTER ORGANIZATION AND ARCHITECTURE

#### Course Objective:

- To learn the fundamentals of computer organization and its relevance to classical and modern problems of computer design
- To make the students understand the structure and behavior of various functional modules of a computer.
- To understand the techniques that computers use to communicate with I/O devices
- To study the concepts of pipelining and the way it can speed up processing.
- To understand the basic characteristics of multiprocessors

#### Learning Outcome:

- Ability to use memory and I/O devices effectively
- Able to explore the hardware requirements for cache memory and virtual memory
- Ability to design algorithms to exploit pipelining and multiprocessors

#### UNIT I

##### Introduction to Computer Organization and Architecture

Basic Computer Organization – CPU Organization – Memory Subsystem Organization and Interfacing – I/O Subsystem Organization and Interfacing – A Simple Computer Levels of Programming Languages, Assembly Language Instructions, Instruction Set Architecture Design, A simple Instruction Set Architecture

#### UNIT II

##### CPU Design and Computer Arithmetic

**CPU Design:** Instruction Cycle – Memory – Reference Instructions – Input/output and Interrupt – Addressing Modes – Data Transfer and Manipulation – Program Control.

**Computer Arithmetic:** Addition and Subtraction – Multiplication Algorithms – Division Algorithms – Floating-Point Arithmetic Operations – Decimal Arithmetic unit.

#### UNIT III

##### Register Transfer Language and Design of Control Unit

**Register Transfer:** Register Transfer Language – Register Transfer – Bus and Memory Transfers – Arithmetic Micro operations – Logic Micro operations – Shift Micro operations.

**Control Unit:** Control Memory – Address Sequencing – Micro program Example – Design of Control Unit.

#### UNIT IV

##### Memory and Input/output Organization

**Memory Organization:** Memory Hierarchy – Main Memory – Auxiliary Memory – Associative Memory – Cache Memory – Virtual Memory.

**Input/output Organization:** Input-Output Interface – Asynchronous Data Transfer – Modes of Transfer – Priority Interrupt – Direct Memory Access (DMA).

#### UNIT V

##### Pipeline and Multiprocessors

**Pipeline:** Parallel Processing – Pipelining – Arithmetic Pipeline – Instruction Pipeline.

**Multiprocessors:** Characteristics of Multiprocessors – Interconnection Structures – Inter Processor Arbitration – Inter Processor Communication and Synchronization.

**Text Books:**

1. “Computer Systems Organization and Architecture”, John D. Carpinelli, PEA, 2009.
2. “Computer Systems Architecture”, 3/e, M. Moris Mano, PEA, 2007.

**Reference Books:**

1. “Computer Organization”, Carl Hamacher, Zvonks Vranesic, SafeaZaky, 5/e, MCG, 2002.
2. “Computer Organization and Architecture”, 8/e, William Stallings, PEA, 2010.
3. “Computer Systems Architecture a Networking Approach”, 2/e, Rob Williams.
4. “Computer Organization and Architecture” Ghoshal, Pearson Education, 2011.
5. “Computer Organization and Architecture”, V. Rajaraman, T. Radakrishnan.
6. “Computer Organization and Design”, P. Pal Chaudhuri, PHI
7. “Structured Computer Organization”, Andrew S. Janenbaum, Todd Austin
8. “Computer Architecture” Parahmi, Oxford University Press

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### (13A05402) DATABASE MANAGEMENT SYSTEMS

#### *Course Objective:*

- *To provide the student with clear conceptual understandings related to databases. After this course, the student should gain knowledge in the relational model, SQL, database design, storage & indexing, failure recovery and concurrency control.*

#### *Learning Outcome:*

- *Students can design the simple database, and can use the SQL instructions in developing the database applications.*
- *Can apply the ER concepts to design the databases.*
- *Advanced concepts like triggers, assertions and constraints can be applied effectively in designing the business applications.*

#### **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**

**Functional Dependencies** – Rules about Functional Dependencies -- Design of Relational Database Schemas – Multivalued Dependencies.

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

#### **UNIT III**

**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 - Transactions in SQL: Serializability, Atomicity, Transactions, Readonly Transactions, Dirty Reads, Other isolation levels.

**Constraints and Triggers** – Keys and Foreign keys – Constraints on Attributes and Tuples, Schema-level Constraints and Triggers.

#### **UNIT IV**

**Representing Data Elements** – Data Elements and Fields – Records – Representing Block and Record Addresses – Variable Length Data and Records – Record Modifications.

**Index Structures** – Indexes on Sequential Files – Secondary Indexes – B-Trees – Hash Tables.

#### **UNIT V**

**Coping with System Failures** – Issues and Models for Resilient Operation – Undo Logging – Redo Logging – Undo/Redo Logging – Protecting Against Media Failures.

**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.

**Text Books:**

1. *“Database Systems, The Complete Book”*, Hector Garcia-Molina, Jeffrey D. Ullman and Jennifer Widom, 6<sup>th</sup> 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, 6<sup>th</sup> 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.



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### (13A05403) JAVA PROGRAMMING

#### **Course Objective:**

- Study the syntax, semantics and features 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

#### **Learning Outcome:**

- Ability to solve problems using object oriented approach and implement them using Java
- Ability to write Efficient programs with multitasking ability and handle exceptions
- Create user friendly interface

#### **UNIT I**

**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

#### **UNIT II**

**Classes:** Classes, Objects, Methods, Parameters, Constructors, Garbage Collection, Access modifiers, Pass Objects and arguments, Method and Constructor Overloading, Understanding static, Nested and inner classes.

**Inheritance** – Basics, Member Access, Usage of Super, Multi level hierarchy, Method overriding, Abstract class, Final keyword.

**Interfaces** – Creating, Implementing, Using, Extending, and Nesting of interfaces. **Packages** – Defining, Finding, Member Access, Importing.

#### **UNIT III**

**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.

**I/O:** Byte streams and Classes, Character streams and Classes, Predefined streams, Using byte streams, Reading and Writing files using byte streams, Reading and writing binary data, Random-access files, File I/O using character streams, Wrappers.

#### **UNIT IV**

**Multithreading:** Fundamentals, Thread class, Runnable interface, Creating multiple threads, Life cycle of thread, Thread priorities, Synchronization, Thread communication, Suspending, Resuming and Stopping threads. **Applets:** Basics, skeleton, Initialization and termination, Repainting, Status window, Passing parameters.

**Networking:** Basics, Networking classes and interfaces, InetAddress, Inet4Address and Inet6Address, TCP/IP Client Sockets, URL, URLConnection, HttpURLConnection, The URI class, Cookies, TCP/IP Server sockets, Datagrams.

#### **UNIT V**

**Swings:** The origin and design philosophy of swing, Components and containers, Layout managers, Event handling, Using a push button, jtextfield, jlabel and image icon, The swing buttons, Trees, An overview of jmenubar, jmenu and jmenuitem, Creating a main menu, Add mnemonics and accelerators to Menu items, showmessagedialog, showconfirmdialog, showinputdialog, showoptiondialog, jdialog, Create a modeless dialog.

**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, 8<sup>th</sup> Edition, 2011, Oracle press, TataMcGraw-Hill

**Reference Books:**

1. *“Programming with Java”* T.V.Suresh Kumar, B.Eswara Reddy, P.Raghavan Pearson Edition.
2. *“Java – How to Program”*, Paul Deitel, Harvey Deitel, PHI.
3. *“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

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B.Tech. II - II Sem.

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### (13A05404) FORMAL LANGUAGES AND AUTOMATA THEORY

#### Course Objective:

- Understand formal definitions of machine models.
- Classify machines by their power to recognize languages.
- Understanding of formal grammars, analysis
- Understanding of hierarchical organization of problems depending on their complexity
- Understanding of the logical limits to computational capacity
- Understanding of undecidable problems

#### Learning Outcome:

At the end of the course, students will be able to

- Construct finite state diagrams while solving problems of computer science
- Find solutions to the problems using Turing machines
- Design of new grammar and language

#### UNIT I

**Introduction:** Basics of set theory, Relations on sets, Deductive proofs, Reduction to definitions, Other theorem forms, Proving equivalences about sets, The Contrapositive, Proof by contradiction, Counter examples, Inductive proofs, Alphabets, Strings, Languages, Problems, Grammar formalism, Chomsky Hierarchy

**Finite Automata:** An Informal picture of Finite Automata, Deterministic Finite Automata (DFA), Non Deterministic Finite Automata (NFA), Applying FA for Text search, Finite Automata with Epsilon transitions ( $\epsilon$ -NFA or NFA-  $\epsilon$ ), Finite Automata with output, Conversion of one machine to another, Minimization of Finite Automata, Myhill-Nerode Theorem.

#### UNIT II

**Regular Languages:** Regular Expressions (RE), Finite Automata and Regular Expressions, Applications of Regular Expressions, Algebraic laws for Regular Expressions, The Arden's Theorem, Using Arden's theorem to construct RE from FA, Pumping Lemma for RLs, Applications of Pumping Lemma, Equivalence of Two FAs, Equivalence of Two REs, Construction of Regular Grammar from RE, Constructing FA from Regular Grammar, Closure properties of RLs, Decision problem's of RLS, Applications of REs and FAs

#### UNIT III

**Context Free Grammars and Languages:** Definition of Context Free Grammars (CFG), Derivations and Parse trees, Ambiguity in CFGs, Removing ambiguity, Left recursion and Left factoring, Simplification of CFGs, Normal Forms, Linear grammars, Closure properties for CFLs, Pumping Lemma for CFLs, Decision problems for CFLs, CFG and Regular Language..

#### UNIT IV

**Push Down Automata (PDA):** Informal introduction, The Formal Definition, Graphical notation, Instantaneous description, The Languages of a PDA, Equivalence of PDAs and CFGs, Deterministic Push Down Automata, Two Stack PDA.

#### UNIT V

**Turing Machines and Undecidability:** Basics of Turing Machine (TM), Transitional Representation of TMs, Instantaneous description, Non Deterministic TM, Conversion of Regular Expression to TM, Two stack PDA and TM, Variations of the TM, TM as an integer function, Universal TM, Linear Bounded Automata, TM Languages, Unrestricted grammar, Properties of Recursive and Recursively enumerable languages, Undecidability, Reducibility, Undecidable problems about TMs, Post's Correspondence Problem(PCP), Modified PCP.

**Text Books:**

1. *Introduction to Automata Theory, Formal Languages and Computation*, Shyamalendu kandar, Pearson.
2. *Introduction to Automata Theory, Languages, and Computation, Third Edition*, John E.Hopcroft, Rajeev Motwani, Jeffery D. Ullman, Pearson.

**Reference Books:**

1. *Introduction to Languages and the Theory of Computation*, John C Martin, TMH, Third Edition.
2. *Theory of Computation*, Vivek Kulkarni, OXFORD.
3. *Introduction to the Theory of Computation.*, Michel Sipser, 2<sup>nd</sup> Edition, Cengage Learning
4. *Theory of computer Science Automata, Languages and Computation*, K.L.P. Mishra, N. Chandrasekaran, PHI, Third Edition.
5. *Fundamentals of the Theory of Computation, Principles and Practice*, Raymond Greenlaw, H. James Hoover, Elsevier, Morgan Kaufmann.
6. *Finite Automata and Formal Language A Simple Approach*, A.M. Padma Reddy, Pearson

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### (13A05405) PRINCIPLES OF PROGRAMMING LANGUAGES

#### **Course Objective:**

- To study various programming paradigms.
- To provide conceptual understanding of High level language design and implementation.
- To introduce the power of scripting languages

#### **Learning Outcome:**

- Select appropriate programming language for problem solving
- Design new programming language.
- Gain Knowledge and comparison of the features of programming languages

#### **UNIT I**

**Preliminary Concepts:** Reasons for studying, Programming domains, Language Evaluation Criteria, Influences on Language design, Language categories, Language design Trade-offs, Implementation methods, Programming environments.

**Syntax and Semantics:** Introduction, General problem of describing syntax, Formal methods of describing syntax, Describing the meaning of programs – Dynamic semantics.

**Introduction to Programming concepts:** Names, Variables, The concept of binding, Type checking, Strong typing, Type compatibility, Scope, Scope and lifetime, Referencing environments, Named constants

#### **UNIT II**

**Data types:** Introduction, primitive, Character string, user defined ordinal, array, associative array, record, union, pointer and reference types

**Expressions:** Arithmetic relational and Boolean expressions, Type conversions, Short circuit evaluation, Assignment Statements, Mixed-mode arithmetic.

**Control Structures** – Selection, Iterative, Unconditional branching, guarded commands.

#### **UNIT III**

**Subprograms:** Fundamentals of sub-programs, Design issues of subprograms, Local referencing environments, Parameter passing methods, Generic sub-programs: Generic functions in C++, Generic methods in Java, Design issues for functions, Coroutines, General semantics of Calls and Returns, Implementing Simple subprograms, Implementing subprograms with Stack-Dynamic Local variables, Nested subprograms.

#### **UNIT IV**

**Concurrency:** Why concurrency, Programs and processes, Problems with concurrency, Process interactions, Subprogram level concurrency, semaphores, monitors, message passing, Java threads, C# threads, statement level concurrency.

**Exception handling:** Exceptions, exception Propagation, Exception handling in Java.

**Logic Programming:** Introduction, Introduction to Predicate calculus, Predicate calculus and proving theorems, Overview of logic programming, Origins of prolog, Basic elements of prolog, Deficiencies of prolog, Applications of logic programming

#### **UNIT V**

**Functional Programming Languages:** Introduction, Mathematical functions, Fundamentals of functional programming languages, Fundamentals of LISP, Common lisp, Applications of Functional languages, Comparison of Functional and imperative languages.

**Scripting Language:** Pragmatics, Key Concepts, Case Study : Python – Values and Types, Variables , Storage and Control, Bindings and Scope, Procedural Abstraction, Data Abstraction, Separate Compilation, Module Library

**Text Books:**

1. *Concepts of Programming Languages*, Robert .W. Sebesta 10/e, Pearson Education,2008.
2. *Programming Language Design Concepts*, D. A. Watt, Wiley dreamtech, rp-2007.

**Reference Books :**

1. *Programming Languages*, 2nd Edition, A.B. Tucker, R.E. Noonan, TMH.
2. *Programming Languages*, K. C.Louden, 2nd Edition, Thomson, 2003.
3. *LISP*, Patric Henry Winston and Paul Horn, Pearson Education.
4. *Programming in Prolog*, W.F. Clocksin, & C.S.Mellish, 5th Edition, Springer.
5. *Programming Python*, M.Lutz, 3rd Edition, O'reilly, SPD, rp-2007.
6. *Core Python Programming*, Chun, II Edition, Pearson Education, 2007.
7. *Guide to Programming with Python*, Michael Dawson, Thomson, 2008

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(13A05406) DESIGN AND ANALYSIS OF ALGORITHMS

**Course Objective:**

- To know the importance of the complexity of a given algorithm.
- To study various algorithmic design techniques.
- To utilize data structures and/or algorithmic design techniques in solving new problems.
- To know and understand basic computability concepts and the complexity classes P, NP, and NP-Complete.
- To study some techniques for solving hard problems.

**Learning Outcome:**

- Analyze the complexity of the algorithms
- Use techniques divide and conquer, greedy, dynamic programming, backtracking, branch and bound to solve the problems.
- Identify and analyze criteria and specifications appropriate to new problems, and choose the appropriate algorithmic design technique for their solution.
- Able to prove that a certain problem is NP-Complete.

**UNIT I**

**Introduction:** What is an Algorithm, Algorithm specification, Performance analysis.

**Divide and Conquer:** General method, Binary Search, Finding the maximum and minimum, Merge sort, Quick Sort, Selection sort, Strassen's matrix multiplication.

**UNIT II**

**Greedy Method:** General method, Knapsack problem, Job Scheduling with Deadlines, Minimum cost Spanning Trees, Optimal storage on tapes, Single-source shortest paths.

**Dynamic programming:** General Method, Multistage graphs, All-pairs shortest paths, Optimal binary search trees, 0/1 knapsack, The traveling sales person problem.

**UNIT III**

**Basic Traversal and Search Techniques:** Techniques for binary trees, Techniques for Graphs, Connected components and Spanning trees, Bi-connected components and DFS

**Back tracking:** General Method, 8 – queens problem, Sum of subsets problem, Graph coloring and Hamiltonian cycles, Knapsack Problem.

**UNIT IV**

**Branch and Bound:** The method, Travelling salesperson, 0/1 Knapsack problem, Efficiency considerations.

**Lower Bound Theory:** Comparison trees, Lower bounds through reductions – Multiplying triangular matrices, Inverting a lower triangular matrix, Computing the transitive closure.

**UNIT V**

**NP – Hard and NP – Complete Problems:** NP Hardness, NP Completeness, Consequences of being in P, Cook's Theorem, Reduction Source Problems, Reductions: Reductions for some known problems.

**Text Books:**

1. *“Fundamentals of Computer Algorithms”*, Ellis Horowitz, S. Satraj Sahani and Rajasekhran, 2<sup>nd</sup> edition, 2012, University Press.
2. *“Design and Analysis of Algorithms”*, Parag Himanshu Dave, Himanshu Bhalchandra Dave, Second Edition, 2009, Pearson Education.

**Reference Books :**

1. *“Introduction to Algorithms”*, second edition, T.H.Cormen, C.E.Leiserson, R.L.Rivest, and C.Stein, PHI Pvt. Ltd./ Pearson Education
2. *“Introduction to Design and Analysis of Algorithms A strategic approach”*, R.C.T.Lee, S.S.Tseng, R.C.Chang and T.Tsai, Mc Graw Hill.
3. *“Data structures and Algorithm Analysis in C++”*, Allen Weiss, Second edition, Pearson education.
4. *“Design and Analysis of algorithms”*, Aho, Ullman and Hopcroft, Pearson education.
5. *“Algorithms”* – Richard Johnson baugh and Marcus Schaefer, Pearson Education



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### (13A05407) DATABASE MANAGEMENT SYSTEMS LAB

#### *Course Objective:*

- *To create a database and query it using SQL, design forms and generate reports.*
- *Understand the significance of integrity constraints, referential integrity constraints, triggers, assertions.*

#### *Learning Outcome:*

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

#### **LIST OF EXPERIMENTS:**

1. Practice session: Students should be allowed to choose appropriate DBMS software, install it, configure it and start working on it. Create sample tables, execute some queries, use SQLPLUS features, use PL/SQL features like cursors on sample database. Students should be permitted to practice appropriate User interface creation tool and Report generation tool.
2. A college consists of number of employees working in different departments. In this context, create two tables **employee** and **department**. Employee consists of columns empno, empname, basic, hra, da, deductions, gross, net, date-of-birth. The calculation of hra,da are as per the rules of the college. Initially only empno, empname, basic have valid values. Other values are to be computed and updated later. Department contains deptno, deptname, and description columns. Deptno is the primary key in department table and referential integrity constraint exists between employee and department tables. Perform the following operations on the the database:
  - Create tables department and employee with required constraints.
  - Initially only the few columns (essential) are to be added. Add the remaining columns separately by using appropriate SQL command
  - Basic column should not be null
  - Add constraint that basic should not be less than 5000.
  - Calculate hra,da,gross and net by using PL/SQL program.
  - Whenever salary is updated and its value becomes less than 5000 a trigger has to be raised preventing the operation.
  - The assertions are: hra should not be less than 10% of basic and da should not be less than 50% of basic.
  - The percentage of hra and da are to be stored separately.
  - When the da becomes more than 100%, a message has to be generated and with user permission da has to be merged with basic.
  - Empno should be unique and has to be generated automatically.
  - If the employee is going to retire in a particular month, automatically a message has to be generated.
  - The default value for date-of-birth is 1 jan, 1970.
  - When the employees called daily-wagers are to be added the constraint that salary should be greater than or equal to 5000 should be dropped.
  - Display the information of the employees and departments with description of the fields.

- Display the average salary of all the departments.
- Display the average salary department wise.
- Display the maximum salary of each department and also all departments put together.
- Commit the changes whenever required and rollback if necessary.
- Use substitution variables to insert values repeatedly.
- Assume some of the employees have given wrong information about date-of-birth. Update the corresponding tables to change the value.
- Find the employees whose salary is between 5000 and 10000 but not exactly 7500.
- Find the employees whose name contains '\_en'.
- Try to delete a particular deptno. What happens if there are employees in it and if there are no employees.
- Create alias for columns and use them in queries.
- List the employees according to ascending order of salary.
- List the employees according to ascending order of salary in each department.
- Use '&' wherever necessary
- Amount 6000 has to be deducted as CM relief fund in a particular month which has to be accepted as input from the user. Whenever the salary becomes negative it has to be maintained as 1000 and the deduction amount for those employees is reduced appropriately.
- The retirement age is 60 years. Display the retirement day of all the employees.
- If salary of all the employees is increased by 10% every year, what is the salary of all the employees at retirement time.
- Find the employees who are born in leap year.
- Find the employees who are born on feb 29.
- Find the departments where the salary of atleast one employee is more than 20000.
- Find the departments where the salary of all the employees is less than 20000.
- On first January of every year a bonus of 10% has to be given to all the employees. The amount has to be deducted equally in the next 5 months. Write procedures for it.
- As a designer identify the views that may have to be supported and create views.
- As a designer identify the PL/SQL procedures necessary and create them using cursors.
- Use appropriate Visual programming tools like oracle forms and reports, visual basic etc to create user interface screens and generate reports.

**Note:** As a designer identify other operations that may be required and add to the above list. The above operations are not in order. Order them appropriately. Use SQL or PL/SQL depending on the requirement.

3. Students may be divided into batches and the following experiments may be given to them to better understand the DBMS concepts. Students should gather the required information, draw ER diagrams, map them to tables, normalize, create tables, triggers, procedures, execute queries, create user interfaces, and generate reports.
  - Student information system
  - APSRTC reservation system
  - Hostel management
  - Library management
  - Indian Railways reservation
  - Super market management
  - Postal system
  - Banking system
  - Courier system
  - Publishing house system

**References:**

1. *“Learning Oracle SQL and PL/SQL”*, Rajeeb C. Chatterjee, PHI.
2. *“Oracle Database 11g PL/SQL Programming”*, M.Mc Laughlin, TMH.
3. *“Introduction to SQL”*, Rick F. Vander Lans, Pearson education.
4. *“Oracle PL/SQL”*, B.Rosenzweig and E.Silvestrova, Pearson education.

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**(13A05408) JAVA PROGRAMMING LAB**

**Week-1:**

1. Use Eclipse or Netbean platform and acquaint with the various menus. Create a test project, add a test class and run it. See how you can use auto suggestions, auto fill. Try code formatter and code refactoring like renaming variables, methods and classes. Try debug step by step with java program to find prime numbers between 1 to n.

**Week-2:**

1. Write a Java program that prints all real and imaginary solutions to the quadratic equation  $ax^2 + bx + c = 0$ . Read in a, b, c and use the quadratic formula.
2. Write a Java program for sorting a given list of names in ascending order
3. Write a java program to accept a string from user and display number of vowels, consonants, digits and special characters present in each of the words of the given text.

**Week -3:**

1. Write a java program to make rolling a pair of dice 10,000 times and counts the number of times doubles of are rolled for each different pair of doubles.  
*Hint: Math.random()*
2. Write java program that inputs 5 numbers, each between 10 and 100 inclusive. As each number is read display it only if it's not a duplicate of any number already read display the complete set of unique values input after the user enters each new value.
3. Write a java program to read the time intervals (HH:MM) and to compare system time if the system time between your time intervals print correct time and exit else try again to repute the same thing. By using StringTokenizer class.

**Week-4:**

1. Write a java program to split a given text file into n parts. Name each part as the name of the original file followed by .part<n> where n is the sequence number of the part file.
2. Write java program to create a super class called Figure that receives the dimensions of two dimensional objects. It also defines a method called area that computes the area of an object. The program derives two subclasses from Figure. The first is Rectangle and second is Triangle. Each of the sub class overridden area() so that it returns the area of a rectangle and a triangle respectively.
3. Write a Java program that creates three threads. First thread displays —Good Morning! every one second, the second thread displays —Hello! every two seconds and the third thread displays —Welcome! every three seconds

**Week-5:**

1. Write a Java program that correctly implements producer consumer problem using the concept of inter thread communication
2. Write a java program to find and replace pattern in given file,
3. Use inheritance to create an exception super class called EexceptionA and exception sub class ExceptionB and ExceptionC, where ExceptionB inherits from ExceptionA and ExceptionC inherits from ExceptionB. Write a java program to demonstrate that the catch block for type ExceptionA catches exception of type ExceptionB and ExceptionC

**Week-6:**

1. Write a java program to convert an ArrayList to an Array.
2. Write a Java Program for waving a Flag using Applets and Threads
3. Write a Java Program for Bouncing Ball (The ball while moving down has to increase the size and decrease the size while moving up)

**Week-7:**

1. Write a Java Program for stack operation using Buttons and JOptionPane input and Message dialog box.
2. Write a Java Program to Addition, Division, Multiplication and subtraction using JOptionPane dialog Box and Textfields.

**Week-8:**

1. Write a Java Program for the blinking eyes and mouth should open while blinking.
2. Implement a Java Program to add a new ball each time the user clicks the mouse. Provided a maximum of 20 balls randomly choose a color for each ball.

**Week-9:**

1. Suppose that a table named Table.txt is stored in a text file. The first line in the file is the header, and the remaining lines correspond to rows in the table. The elements are separated by commas. Write a java program to display the table using Jtable component
2. Write a program that creates a user interface to perform integer divisions. The user enters two numbers in the text fields, Num1 and Num2. The division of Num1 and Num2 is displayed in the Result field when the Divide button is clicked. If Num1 or Num2 were not an integer, the program would throw a NumberFormatException. If Num2 were Zero, the program would throw an ArithmeticException Display the exception in a message dialog box.

**Week-10:**

1. Write a Java Program to implement the opening of a door while opening man should present before hut and closing man should disappear.
2. Write a Java code by using JTextField to read decimal value and converting a decimal number into binary number then print the binary value in another JTextField

**Week-11:**

1. Write a Java program that works as a simple calculator. Use a grid layout to arrange buttons for the digits and for the +, -, \*, % operations. Add a text field to display the result.
2. Write a Java program for handling mouse events.

**Week-12:**

1. Write a java program establish a JDBC connection, create a table student with properties name, register number, mark1, mark2, mark3. Insert the values into the table by using the java and display the information of the students at front end.

*Note: In addition to the above experiments, the instructor may identify the experiments in the important concepts like Multi Threading (Producer Consumer Problem etc.) and Networking (Client-Server problem etc.).*

**Text Books:**

1. *Java How to Program, Sixth Edition, H.M.Dietel and P.J.Dietel, Pearson Education/PHI*
2. *Java The Complete Reference" by Herbert Schildt, TMH, 8<sup>th</sup> Edition*

**Reference Books:**

1. *Introduction to Java programming, Sixth edition, Y.Daniel Liang, Pearson Education*
2. *Programming in Java, Sachine*
3. *Big Java, 2<sup>nd</sup> edition, Cay Horstmann, Wiley Student Edition, Wiley India Private Limited.*
4. *Introduction to Programming with Java, J.Dean & R.Dean, McGraw Hill education.*
5. *Java Programming, D S Malik, Cengage Learning, India Edition*

**(13A52301) HUMAN VALUES & PROFESSIONAL ETHICS (AUDIT COURSE)**

**Course Objective:**

- *This course deals with professional ethics which includes moral issues and virtues, social responsibilities of an engineer, right, qualities of Moral Leadership*

**UNIT I**

**ENGINEERING ETHICS**

Senses of 'Engineering Ethics' – Variety of Moral Issues – Types of Inquiry – Moral Dilemmas – Moral Autonomy – Kohlberg's Theory – Gilligan's Theory – Consensus and Controversy – Professions and Professionalism – Professional Ideals and Virtues – Uses of Ethical Theories

**UNIT II**

**ENGINEERING AS SOCIAL EXPERIMENTATION**

Engineering as Experimentation – Engineers as Responsible Experimenters – Research Ethics – Codes of Ethics – Industrial Standards – A Balanced Outlook on Law – The Challenger Case Study

**UNIT III**

**ENGINEER'S RESPONSIBILITY FOR SAFETY**

Safety and Risk – Assessment of Safety and Risk – Risk Benefit Analysis – Reducing Risk – The Government Regulator's Approach to Risk – Chernobyl Case Studies and Bhopal

**UNIT IV**

**RESPONSIBILITIES AND RIGHTS**

Collegiality and Loyalty – Respect for Authority – Collective Bargaining – Confidentiality – Conflicts of Interest – Occupational Crime – Professional Rights – Employee Rights – Intellectual Property Rights (IPR) – Discrimination

**UNIT V**

**GLOBAL ISSUES**

Multinational Corporations – Business Ethics – Environmental Ethics – Computer Ethics - Role in Technological Development – Weapons Development – Engineers as Managers – Consulting Engineers – Engineers as Expert Witnesses and Advisors – Honesty – Moral Leadership – Sample Code of Conduct

**Text Books:**

1. Mike Martin and Roland Schinzinger, "Ethics in Engineering", McGraw Hill, New York 2005.
2. Charles E Harris, Michael S Pritchard and Michael J Rabins, "Engineering Ethics – Concepts and Cases", Thompson Learning, 2000.

**Reference Books:**

1. Charles D Fleddermann, "Engineering Ethics", Prentice Hall, New Mexico, 1999.
2. John R Boatright, "Ethics and the Conduct of Business", Pearson Education, 2003.
3. Edmund G Seebauer and Robert L Barry, "Fundamentals of Ethics for Scientists and Engineers", Oxford University Press, 2001.
4. Prof. (Col) P S Bajaj and Dr. Raj Agrawal, "Business Ethics – An Indian Perspective", Biztantra, New Delhi, 2004.
5. David Ermann and Michele S Shauf, "Computers, Ethics and Society", Oxford University Press, 2003.

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR**

**B.Tech. III - I Sem.**

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**(13A05501) OPERATING SYSTEMS**

**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.*

**Learning Outcome:**

- Able to use operating systems effectively.
- Write System and application programs to exploit operating system functionality.
- Add functionality to the existing 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 Silberchatz, 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.



## JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

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### (13A05502) COMPILER DESIGN

#### **Course Objective:**

The objectives of the course are

- To realize the computer science as the basis for real time applications
- To introduce the major concept areas of language translation and compiler design.
- To learn how a compiler works and know about the powerful compiler generation tools and techniques, which are useful to the other non-compiler applications.
- To know the importance of code optimization.

#### **Learning Outcome:**

Upon completion of this course, students will be:

- Able to design a compiler for a simple programming language
- Able to use the tools related to compiler design effectively and efficiently
- Able to write the optimized code

#### UNIT I

**Introduction:** Language processors, Phases of a compiler, Pass and phase, Bootstrapping, Compiler construction tools, Applications of compiler technology, Programming language basics

**Lexical Analysis:** Role and Responsibility, Input buffering, Specification of tokens, Recognition of tokens, LEX tool, Design of a Lexical Analyzer generator

#### UNIT II

**Syntax Analysis:** Role of the parser, Context Free Grammars - Definition, Derivations, Parse trees, Ambiguity, Eliminating ambiguity, Left recursion, Left factoring.

**TOP Down Parsing:** Recursive descent parsing, Non-recursive predictive parsing, LL(1) grammars, Error recovery in predictive parsing.

**Bottom Up Parsing:** Handle pruning, Shift-Reduce parsing, Conflicts during shifts- reduce parsing, SLR Parsing, Canonical LR(1) parsers, LALR parsers, Using ambiguous grammars, YACC tool.

#### UNIT III

**Syntax Directed Translation:** Syntax Directed Definitions, Evaluation orders for SDD's, Application of SDT, SDT schemes, Implementing L-attribute SDD's.

**Intermediated Code Generation:** Need for intermediate code, Types of intermediate code, Three address code, Quadruples, Triples, Type expressions, Type equivalence, Type checking, Translation of expressions, control flow statements, switch statement, procedures, back patching.

#### UNIT IV

**Run Time Storage Organization:** Scope and Life time of variable, Information associated with symbols in symbol table, Data Structures for symbol Table, Static vs dynamic storage allocation, Stack allocation of space, Access to non-local data on stack, Heap management, Introduction to garbage collection

**Optimization:** Need and objective of optimization, Places of optimization, Optimization at user level, Construction of Basic blocks and Processing, Data Flow analysis using flow graph, Data flow equations for blocks with back ward flow control, Principles source of optimization and transformations, Alias, Loops in flow graphs, Procedural optimization, Loop optimization

#### UNIT V

**Code Generation:** Issues in code Generation, Target machine architecture, Subsequent Use information, Simple code generator, Register allocation, DAG representation of basic blocks, Code generation from intermediate code, Peephole optimization, Code scheduling

**Text Books :**

1. *Compilers Principles, Techniques and Tools, Second Edition, Alfred V. Aho, Monica S. Lam, Ravi Sethi, Jeffrey D. Ullman., Pearson.*
2. *Compiler Design, K. Muneeswaran., Oxford University Press, 2012*

**Reference Books :**

1. *Compiler Construction, K.V.N Sunitha, Pearson, 2013*
2. *Engineering a Compiler, Second Edition, Keith D. Cooper & Linda Torczon., Morgan Kaufmann, Elsevier.*
3. *Compilers Principles and Practice, Parag H. Dave, Himanshu B. Dave., Pearson*
4. *Compiler Design, Sandeep Saxena, Rajkumar Singh Rathore., S.Chand publications*
5. *Compiler Design, Santanu Chattopadhyay., PHI*
6. *Principals of Compiler Design, Nadhni Prasad, Elsevier.*

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B.Tech. III - I Sem.

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(13A05503) UNIX AND SHELL PROGRAMMING

**Course Objective:**

*This course is to provide a comprehensive introduction to Shell Programming.*

**Learning Outcome:**

*At the end of the course delegates will acquire*

- The fundamental skills required to write simple and complex Shell scripts to automate jobs and processes in the Unix environment.*

**UNIT I**

The UNIX Environment, Unix structure, Accessing UNIX, common and useful commands. The Vi Editor – Concepts, Modes and Commands. File Systems – File names and types, regular files and Directories and their implementation. Operations on directories, files and on both. Security levels, Changing permissions, Ownership and group

**UNIT II**

Shells- UNIX Session, standard streams, redirection, pipes tee Command, Command Execution and Substitution, Command-Line Editing, job control, Aliases, Variable Types and options, Shell Customization. Filters and Pipes – related Commands. Commands for Translating Characters, Files with duplicate Lines, Counting characters, words and Lines and Comparing files

**UNIT III**

User Communication, Electronic mail, Remote access, and File Transfer. Vi Editor – Local, Global and Range commands and Text manipulation in vi. Editor, and Over view of ex Editor. Atoms and Operators. grep – family and operations and searching for file contents. Overview of sed and awk

**UNIT IV**

**Interactive korn shell and Korn shell Programming:** An overview on sed. Korn shell - Features, Files, Variables, input and output. Environmental Variables and options. Startup Script, Command history and Execution process. Korn shell Programming- Script Concept, Expressions, Decision making and Repetition, Special Parameters and variables, Changing Positional parameters, Argument Validation, Debugging Scripts and Examples

**UNIT V**

**Interactive C shell and C shell Programming:** An overview on awk. C Shell – Features, Files and Variables, output, input, eval Command, environmental Variables, on-off Variables, Startup and Shutdown Scripts, Command history and execution Script. C Shell Programming – script Concepts, expressions, Decision making and repetition, Special Parameters, Changing Positional Parameters, argument Validation, Debugging Scripts and examples

**Text Books :**

- UNIX and Shell Programming, Behrouz A. Forouzan and Richard F. Gilberg, cengage learning publications, Indian Reprint 2012*
- Unix: The Ultimate Guide, Sumitabha Das, Tat Mcgraw-Hill Edition, Indian reprint 2012*

**Reference Books :**

- UNIX and Linux System Administration Handbook, Evi Nemeth, Garth Snyder, Trent R. Hein and Ben Whaley, PHI.*

2. *Essential Linux Administration: A Comprehensive Guide for Beginners*, Chuck Easttom, Cengage Learning
3. *The Linux Programming Interface: A Linux and UNIX System Programming Handbook*, Michael Kerrisk, No Starch Press
4. *A Practical Guide to Linux Commands, Editors, and Shell Programming*, 3rd Edition, Mark G. Sobell, PHI
5. *Advanced Programming in the UNIX Environment*, 3rd Edition, W. Richard Stevens and Stephen A. Rago, Addison-Wesley professional
6. *UNIX Network Programming*, W. Richard Stevens, PHI

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**(13A05504) SOFTWARE ENGINEERING**

**Course Objective:**

- *To understand the software life cycle models.*
- *To understand the software requirements and SRS document.*
- *To understand the importance of modeling and modeling languages.*
- *To design and develop correct and robust software products.*
- *To understand the quality control and how to ensure good quality software.*
- *To understand the planning and estimation of software projects.*
- *To understand the implementation issues, validation and verification procedures.*
- *To understand the maintenance of software*

**Learning Outcome:**

- *Define and develop a software project from requirement gathering to implementation.*
- *Ability to code and test the software*
- *Ability to plan, Estimate and Maintain software systems*

**UNIT I**

**Software and Software Engineering:** The Nature of Software, The Unique Nature of WebApps, Software Engineering, Software Process, Software Engineering Practice, Software Myths.

**Process Models:** A Generic Process Model, Process Assessment and Improvement, Prescriptive Process Models, Specialized Process Models, The Unified Process, Personal and Team Process Models, Process Terminology, Product and Process.

**UNIT II**

**Understanding Requirements:** Requirements Engineering, Establishing the Groundwork, Eliciting Requirements, Developing Use Cases, Building the Requirements Model, Negotiating Requirements, Validating Requirements.

**Requirements Modeling:** Requirements Analysis, Scenario-Based Modeling, UML Models That Supplement the Use Case, Data Modeling Concepts, Class-Based Modeling.

**UNIT III**

**Design Concepts:** Design within the Context of Software Engineering, Design Process, Design Concepts, The Design Model.

**Architectural Design:** Software Architecture, Architectural Genres, Architectural Styles, Architectural Design.

**Component-Level Design:** What is a Component, Designing Class-Based Components, Conducting Component-Level Design, Component-Level Design for WebApps.

**UNIT IV**

**User Interface Design:** The Golden Rules, User Interface Analysis and Design, Interface Analysis, Interface Design Steps, Design Evaluation.

**Coding and Testing:** Coding, Code Review, Software Documentation, Testing, Testing in the Large versus Testing in the Small, Unit Testing, Black-Box Testing, White-Box Testing, Debugging, Program Analysis Tools, Integration Testing, Testing Object-Oriented Programs, System Testing, Some General Issues Associated with Testing.

**UNIT V**

**Software Project Management:** Responsibilities of a Software Project Manager, Project Planning, Metrics for Project Size Estimation, Project Estimation Techniques, Empirical Estimation Techniques,

COCOMO-A Heuristic Estimation Technique, Halstead's Software Science-An Analytical Technique, Staffing Level Estimation, Scheduling, Organization and Team Structures, Staffing, Risk Management, Software Configuration Management. .

**Software Maintenance:** Characteristics of Software Maintenance, Software Reverse Engineering, Software Maintenance Process Models, Estimation of Maintenance cost.

**Text Books :**

1. *Software Engineering A practitioner's Approach*, Roger S. Pressman, Seventh Edition, 2009, McGrawHill International Edition.
2. *Fundamentals of Software Engineering*, Rajib Mall, Third Edition, 2009, PHI.

**Reference Books:**

1. *Software Engineering*, Ian Sommerville, Ninth edition, Pearson education.
2. *Software Engineering : A Primer*, Waman S Jawadekar, Tata McGraw-Hill, 2008
3. *Software Engineering, A Precise Approach*, Pankaj Jalote, Wiley India,2010.
4. *Software Engineering, Principles and Practices*, Deepak Jain, Oxford University Press.
5. *Software Engineering1: Abstraction and modeling*, Diner Bjorner, Springer International edition, 2006.
6. *Software Engineering2: Specification of systems and languages*, Diner Bjorner, Springer International edition , 2006.
7. *Software Engineering Foundations*, Yingxu Wang, Auerbach Publications,2008.
8. *Software Engineering Principles and Practice*, Hans Van Vliet,3<sup>rd</sup> edition, John Wiley & Sons Ltd.
9. *Software Engineering 3:Domains,Requirements,and Software Design*, D.Bjorner, Springer International Edition.
10. *Introduction to Software Engineering*, R.J.Leach, CRC Press.

## JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

**B.Tech. III - I Sem.**

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### (13A04507) MICROPROCESSORS & INTERFACING

#### **Course Objective:**

- Study the instruction set of 8086 microprocessor and its architecture
- Learn assembly language programming using 8086 microprocessor
- Interfacing 8051, 8255, 8237, and 8259

#### **Learning Outcome:**

- Program the 8086 microprocessor
- Interface the 8086 microprocessor with various devices and program them

#### **UNIT I**

Microprocessors-Evolution and Introduction: Microprocessors and Micro Controllers, Microprocessor based system, Origin of Microprocessor, Classification of Microprocessors, Types of Memory, I/O Devices, Technology Improvements Adapted to Microprocessors and Computers, Introduction to 8085 processor, Architecture of 8085, Microprocessor instructions, classification of instructions, Instruction set of 8085.

Intel 8086 Microprocessor architecture, Features, and Signals: Architecture of 8086, Accessing memory locations, PIN details of 8086.

#### **UNIT II**

Addressing Modes, Instruction Set and Programming of 8086: Addressing modes in 8086, Instruction set of 8086, 8086 Assembly Language Programming, Modular Programming.

#### **UNIT III**

8086 Interrupts: Interrupt types in 8086, Processing of Interrupts by 8086, Dedicated interrupt types in 8086, Software interrupts-types 00H-FFH, Priority among 8086 interrupts, Interrupt service routines, BIOS interrupts or functional calls, Interrupt handlers, DOS services-INT 21H, System calls-BIOS services.

Memory and I/O Interfacing: Physical memory organization in 8086, Formation of system bus, Interfacing RAM and EPROM chips using only logic gates, Interfacing RAM/ EPROM chips using decoder IC and logic gates, I/O interfacing, Interfacing 8-bit input device with 8086, Interfacing output device using 8086, Interfacing printer with 8086, Interfacing 8-bit and 16-bit I/O devices or ports with 8086, Interfacing CRT terminal with 8086.

#### **UNIT IV**

Features and Interfacing of programmable devices for 8086 systems: Intel 8255 programmable peripheral interface, Interfacing switches and LEDs, Interfacing seven segment displays, Traffic light control, Interfacing analog to digital converters, Intel Timer IC 8253, Introduction to serial communication, 8259 programmable controller, 8237 DMA controller.

#### **UNIT V**

Introduction to 8051 Micro controllers: Intel's MCS-51 series micro controllers, Intel 8051 architecture, Memory organization, Internal RAM structure, Power control in 8051, Stack operation. 8051 Instruction Set and Programming: Introduction, Addressing modes of 8051, Instruction set of 8051, Hardware features of 8051: Introduction, Parallel ports in 8051, External memory interfacing in 8051, Timers, Interrupts, Serial ports.

Interfacing Examples: Interfacing 8255 with 8051, Interfacing of push button switches and LEDs, Interfacing of seven segment displays.

**Text Books:**

1. *“Microprocessor and Interfacing 8086,8051, 8096 and advanced processors”*, Senthil Kumar, Saravanan, Jeevanathan, Shah, 1<sup>st</sup> edition, 2<sup>nd</sup> impression, 2012, Oxford University Press.
2. *“The X86 Microprocessors”*, Lyla B. Das. , 2010, Pearson.

**Reference Books:**

1. *“Microprocessor and Interfacing: Programming and Hardware”*, Douglas V.Hall, McGrawHill
2. *“8086 microprocessor: Programming and Interfacing the PC”*, Kenneth Ayala, Cengage Learning
3. *“ARM system-on-chip architecture”*, Steve Furber, Addison-Wesley Professional
4. *“The Intel Microprocessors”*, Barry B. Brey, Prentice Hall



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**B.Tech. III-I Sem.**

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**(13A52501) MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS**

**Course Objective:**

*The objectives of this course are to equip the student with the basic inputs of Managerial Economics and Economic Environment of business and to enrich analytical skills in helping them take sound financial decisions for achieving higher productivity.*

**Learning Outcome:**

*The thorough understanding of Managerial Economics and Analysis of Financial Statements facilitates the Technocrats – cum – Entrepreneurs to take-up decisions effectively and efficiently in the challenging Business Environment.*

**UNIT I**

**INTRODUCTION TO MANAGERIAL ECONOMICS**

Managerial Economics - Definition, nature and scope – contemporary importance of Managerial Economics - Demand Analysis: Determinants- Law of Demand - Elasticity of Demand. Significance – types – measurement of elasticity of demand - Demand forecasting- factors governing demand forecasting- methods of demand forecasting –Relationship of Managerial Economics with Financial Accounting and Management.

**UNIT II**

**THEORY OF PRODUCTION AND COST ANALYSIS**

Production Function – Short-run and long- run production - Isoquants and Isocosts, MRTS, least cost combination of inputs - Cobb-Douglas production function - laws of returns - Internal and External economies of scale - **Cost Analysis:** Cost concepts - Break-Even Analysis (BEA) - Managerial significance and limitations of BEA - Determination of Break Even Point (Simple Problems)

**UNIT III**

**INTRODUCTION TO MARKETS AND NEW ECONOMIC ENVIRONMENT**

Market structures: Types of Markets - Perfect and Imperfect Competition - Features, Oligopoly - Monopolistic competition. Price-Output determination - Pricing Methods and Strategies. Forms of Business Organization – Sole Proprietorship- Partnership – Joint Stock Companies – Public Sector Enterprises – New Economic Environment- Economic systems – Economic Liberalization – Privatization and Globalization

**UNIT IV**

**CAPITAL AND CAPITAL BUDGETING**

Concept of Capital - Over and Under capitalization – Remedial measures - Sources of Short term and Long term capital - Estimating Working Capital requirement – Capital budgeting – Features of Capital budgeting proposals – Methods and Evaluation of Capital budgeting – Pay Back Method – Accounting Rate of Return (ARR) – Net Present Value (NPV) – Internal Rate Return (IRR) Method (simple problems)

**UNIT V**

**INTRODUCTION TO FINANCIAL ACCOUNTING AND ANALYSIS**

Financial Accounting – Concept - emerging need and importance - Double-Entry Book Keeping- Journal - Ledger – Trial Balance - Financial Statements - - Trading Account – Profit & Loss Account – Balance Sheet (with simple adjustments). Financial Analysis – Ratios – Techniques – Liquidity, Leverage, Profitability, and Activity Ratios (simple problems).

**Text Books:**

1. *Aryasri: Managerial Economics and Financial Analysis, 4/e, TMH, 2009.*
2. *Varshney & Maheswari: Managerial Economics, Sultan Chand, 2009.*

**Reference Books:**

1. *Premchand Babu, Madan Mohan: Financial Accounting and Analysis, Himalaya, 2009*
2. *S.A. Siddiqui and A.S. Siddiqui: Managerial Economics and Financial Analysis, New Age International, 2009.*
3. *Joseph G. Nellis and David Parker: Principles of Business Economics, Pearson, 2/e, New Delhi.*
4. *Domnick Salvatore: Managerial Economics in a Global Economy, Cengage, 2009.*
5. *H.L.Ahuja: Managerial Economics, S.Chand, 3/e, 2009*

**(13A05505) OPERATING SYSTEM LAB**

1. Practice session: practice use of some basic Linux commands. Document the syntax and semantics of those commands. Practice programs on shell variables, control statements etc.
2. Practice session: Study the features of Linux environment and submit a report on it.
3. Write a shell script that accepts a name from the user and displays whether it is a file, directory or something else.
4. Write a shell script that creates users
5. Write a shell script that searches for a given string in a file
6. Write a shell script that compiles all C files in your home directory and creates executable files
7. Write a shell script that given a filename as argument, deletes all even lines in a file
8. Implement the grep command in C language
9. Write a shell script that removes duplicate lines from a file
10. Write a shell script that enhances find command by adding error messages that explain why the command failed.
11. Write a shell script to backup files in a specified directory
12. Write a shell script that finds all links to a file
13. Write an awk script to count the number of lines in a file that do not contain vowels.
14. Write an awk script to find the number of characters, words and lines in a file.
15. Write C programs that illustrate communication between two unrelated processes using named pipe(FIFO File).
16. Write a C program in which a parent writes a message to a pipe and the child reads the message.
17. Write a C program (sender.c) to create a message queue with read and write permissions to write 3 messages to it with different priority numbers.
18. Write a C program (receiver.c) that receives the messages (from the above message queue and displays them.
19. Configure mail server and file server.
20. Write Client and Server programs in C for connection oriented communication between Server and Client processes using Unix Domain sockets to perform the following: Client process sends a message to the Server Process. The Server receives the message, reverses it and sends it back to the Client. The Client will then display the message to the standard output device.

**Reference Books:**

1. *Unix and Shell programming*, B.A.Forouzan and R.F.Gilberg, Cengage Learning.
2. *Beginning Linux Programming*, 4<sup>th</sup> Edition, N.Matthew, R.Stones,Wrox, Wiley
3. *Advanced Unix Programming*, N.B.Venkateswarulu, BS Publications.
4. *Unix and Shell Programming*, M.G. Venkatesh Murthy, Pearson Education.
5. *Unix Shells by Example*, 4th Edition, Ellie Quigley, Pearson Education.
6. *Sed and Awk*, O.Dougherty&A.Robbins, 2<sup>nd</sup> edition,SPD.
7. *Unix shell Programming*, S.G.Kochan and P.Wood, 3<sup>rd</sup> edition, Pearson Education.
8. *Shell Scripting*, S.Parker, Wiley India Pvt. Ltd.
9. *Advanced Programming in the Unix Environment*, 2<sup>nd</sup> edition, W.R.Stevens and S.A.Rago, Pearson Education.
10. *Linux System Programming*, Robert Love, O'Reilly, SPD

**PART-B**

Simulate the following CPU scheduling algorithms

- a) Round Robin b) SJF c) FCFS d) Priority
2. Simulate all file allocation strategies
  - a) Sequential b) Indexed c) Linked
3. Simulate MVT and MFT
4. Simulate all File Organization Techniques
  - a) Single level directory b) Two level c) Hierarchical d) DAG
5. Simulate Bankers Algorithm for Dead Lock Avoidance
6. Simulate Bankers Algorithm for Dead Lock Prevention
7. Simulate all page replacement algorithms
  - a) FIFO b) LRU c) LFU Etc. ...
8. Simulate Paging Technique of memory management

**Reference Books :**

1. *Operating System Concepts*, Abraham Silberchatz, Peter B. Galvin, Greg Gagne, Eighth edition, John Wiley.
2. *Operating Systems: Internals and Design Principles*, Stallings, Sixth Edition–2009, Pearson Education
3. *Modern Operating Systems*, Andrew S Tanenbaum, Second Edition, PHI.
4. *Operating Systems*, S.Haldar, A.A.Aravind, Pearson Education.
5. *Principles of Operating Systems*, B.L.Stuart, Cengage learning, India Edition.
6. *Operating Systems*, A.S.Godbole, Second Edition, TMH.
7. *An Introduction to Operating Systems*, P.C.P. Bhatt, PHI.

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR**  
**III B.Tech. ISem. L C 3 2**

**(13A05506) COMPILER DESIGN AND ASSEMBLY LANGUAGE PROGRAMMING**  
**LAB**

**Compiler Design Lab**

1. Write a program to search for a given pattern in a set of files. It should support regular expressions should work similar to grep and fgrep of Linux environment.
2. Write programs for DFA, NFA.
3. Consider the following regular expressions:
  - a)  $(0 + 1)^* 1(0+1)(0+1)$
  - b)  $(ab*c + (def)^+ + a*d^+e)^+$
  - c)  $((a + b)*(c + d)^*)^+ + ab*c*d$Write separate programs for recognizing the strings generated by each of the regular expressions mentioned above (Using FA).
4. Given a text-file which contains some regular expressions, with only one RE in each line of the file. Write a program which accepts a string from the user and reports which expression accepts that string. If no RE from the file accepts the string, then report that is matched.
5. Design a PDA for any given CNF. Simulate the processing of a string using the PDA and show parse tree.
6. Design a Lexical analyzer for identifying different types of tokens used in C language.  
*Note: The reserved keywords such as if, else, class, struct etc must be reported as invalid identifiers. C allows identifier names to begin with underscore character too.*
7. Simulate a simple desktop calculator using any lexical analyzer generator tool (LEX or FLEX).
8. Program to recognize the identifiers, if and switch statements of C using a lexical analyzer generator tool.
9. Consider the following grammar:  
S  $\rightarrow$  ABC  
A  $\rightarrow$  abA | ab  
B  $\rightarrow$  b | BC  
C  $\rightarrow$  c | cC  
Design any shift reduced parser which accepts a string and tells whether the string is accepted by above grammar or not.
10. Design a YACC program that reads a C program from input file and identify all valid C identifiers and for loop statements.
11. Program to eliminate left recursion and left factoring from a given CFG.
12. YACC program that reads the input expression and convert it to post fix expression.
13. YACC program that finds C variable declarations in C source file and save them into the symbol table, which is organized using binary search tree.
14. YACC program that reads the C statements from an input file and converts them into quadruple three address intermediate code

**Reference Books :**

1. *Compiler Design using FLEX and YACC, Das, PHI.*
2. *Compiler Design in C, Holub, PHI.*

**Assembly Language Programming Lab**

1. Write an ALP to find factorial of number.
2. The 8 data bytes are stored from memory location E000H to E007H. Write 8086 ALP to transfer the block of data to new location B001H to B008H.
3. Write a program to display string Computer Science & Engineering for 8086.

4. Write a program to reverse the given string for 8086.
5. Write a program to multiply 2 numbers (16-bit data) for 8086.
6. Sum of series of 10 numbers and store result in memory location total.
7. Write a program to find Largest No. in a block of data. Length of block is 0A. Store the maximum in location result.
8. Find number of times letter —e| exist in the string exercise, Store the count at memory
9. Write an assembly language program to count number of vowels in a given string.
10. Write an 8086 ALP which will input the user name from the keyboard. If the user is —Ramu-jntul| it will output —The username is valid| else it will output —Invalid user namel.

**Reference Books :**

1. *Microprocessor and Interfacing 8086,8051, 8096 and advanced processors, Senthil Ku Saravanan, Jeevanathan, Shah, Oxford Publishers, 2012.*
2. *8086 microprocessor: Programming and Interfacing the PC, Kenneth Ayala, Cengage Learning*
3. *The X86 Microprocessors, Lyla B. Das. Pearson, 2012.*

## JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

### B.Tech. III - I Sem.

#### (13A52502) ADVANCED ENGLISH LANGUAGE COMMUNICATION SKILLS LAB (Audit Course)

##### **Introduction:**

*The introduction of the Advanced Communication Skills Lab is considered essential at 3<sup>rd</sup> 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 organise 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.*

##### **Course Objective:**

*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.*

##### **Learning Outcome:**

- *Accomplishment of sound vocabulary and its proper use contextually*
- *Flair in Writing and felicity in written expression.*
- *Enhanced job prospects.*
- *Effective Speaking Abilities*

The following course content to conduct the activities is prescribed for the Advanced English Language Communication Skills (AELCS) Lab:

### **UNIT I**

#### **COMMUNICATIVE COMPETENCY**

1. Reading Comprehension
2. Listening comprehension
3. Vocabulary for competitive purpose
4. Spotting errors

### **UNIT II**

#### **TECHNICAL WRITING**

1. Report writing
2. Curriculum vitae
3. Covering letter
4. E-mail writing

### **UNIT III PRESENTATIONAL SKILLS**

1. Oral presentation
2. Power point presentation
3. Poster presentation
4. Stage dynamics

### **UNIT IV CORPORATE SKILLS**

1. Dress code
2. Telephonic skills
3. Net Etiquettes

### **UNIT V GETTING READY FOR JOB**

1. Group discussions
2. Interview skills
3. Psychometric tests

#### ***Minimum Requirement:***

*The Advanced English Language Communication Skills (AELCS) Laboratory shall have the following infra-structural facilities to accommodate at least 60 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.*  
*K-VAN SOLUTIONS-Advanced communication lab*

1. *DELTA"s key to the Next Generation TOEFL Test: Advanced Skill Practice.*
2. *TOEFL & GRE( KAPLAN, AARCO & BARRONS, USA, Cracking GRE by CLIFFS)*
3. *Train2success.com*

#### ***References:***

1. *Objective English For Competitive Exams, Hari Mohana Prasad, 4<sup>th</sup> edition, Tata Mc Graw Hill.*
2. *Technical Communication by Meenakshi Raman & Sangeeta Sharma, O U Press 2009.*
3. *Books on TOEFL/GRE/GMAT/CAT/ IELTS by Barron"s/DELTA/Cambridge University Press.2012.*
4. *Soft Skills for Everyone, Butterfield Jeff, Cengage Publications, 2011.*
5. *Practice Psychometric Tests: How to familiarize yourself with genuine recruitment tests, 2012.*
6. *Management Shapers Series by Universities Press (India) Pvt Ltd., Himayatnagar, Hyderabad 2008.*
7. *Handbook for Technical Writing by David A McMurrey & Joanne Buckely CENGAGE Learning 2008.*
8. *English for Technical Communication for Engineering Students, Aysha Vishwamohan, Tata Mc Graw-Hill 2009.*
9. *Word Power Made Handy, Shalini Verma, S Chand Publications, 2011.*
10. *Effective Technical Communication, Ashrif Rizvi, TataMcGrahill, 2011.*



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**B.Tech. III - II Sem.**

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**(13A05601) COMPUTER NETWORKS**

**Course Objective**

- *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*

**Learning Outcome:**

- *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**

**Introduction:** Networks, Network Types, Internet History, Standards and Administration, Network Models: Protocol Layering, TCP/IP Protocol Suite, The ISO Model.

**Introduction to physical layer:** Data and Signals, Transmission impairment, Data rate limits, Performance, Transmission media: Introduction, Guided Media, Unguided Media, Switching: Introduction, Circuit Switched Networks, Packet switching.

**UNIT II**

**Introduction to Data Link Layer:** Introduction, Link layer addressing, Error detection and Correction: Cyclic codes, Checksum, Forward error correction, Data link control: DLC Services, Data link layer protocols, HDLC, Point to Point Protocol, Media Access control: Random Access, Controlled Access, Channelization, Connecting devices and virtual LANs: Connecting Devices.

**UNIT III**

**The Network Layer:** Network layer design issues, Routing algorithms, Congestion control algorithms, Quality of service, Internetworking, The network layer in the Internet: IPV4 Addresses, IPV6, Internet Control protocol, OSPF, BGP, IP, ICMPv4, IGMP.

**UNIT IV**

**The Transport Layer:** The Transport Service, Elements of Transport Protocols, Congestion Control, The internet transport protocols: UDP, TCP, Performance problems in computer networks, Network performance measurement.

**UNIT V**

**Introduction to Application Layer:** Introduction, Client Server Programming, WWW and HTTP, FTP, e-mail, TELNET, Secure Shell, Domain Name System, SNMP.

**Text Books:**

1. *“Data communications and networking” 5<sup>th</sup> edition, 2012, Behrouz A. Forouzan, TMH.*
2. *“Computer Networks”, 5<sup>th</sup> edition, 2010, Andrew S. Tanenbaum, Wetherall, Pearson.*

**Reference Books:**

1. *“Internetworking with TCP/IP – Principles, protocols, and architecture- Volume 1, Douglas E. Comer, 5<sup>th</sup> edition, PHI*
2. *“Computer Networks”, 5E, Peterson, Davie, Elsevier.*
3. *“Introduction to Computer Networks and Cyber Security”, Chawan- Hwa Wu, Irwin, CRC Publications.*
4. *“Computer Networks and Internets with Internet Applications”, Comer.*

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**(13A05602) OBJECT ORIENTED ANALYSIS DESIGN & MODELING**

**Course Objective:**

- *To understand how to solve complex problems*
- *Analyze and design solutions to problems using object oriented approach*
- *Study the notations of Unified Modeling Language*

**Learning Outcome:**

- *Ability to find solutions to the complex problems using object oriented approach*
- *Represent classes, responsibilities and states using UML notation*
- *Identify classes and responsibilities of the problem domain*

**UNIT I**

**Introduction:** The Structure of Complex systems, The Inherent Complexity of Software, Attributes of Complex System, Organized and Disorganized Complexity, Bringing Order to Chaos, Designing Complex Systems, Evolution of Object Model, Foundation of Object Model, Elements of Object Model, Applying the Object Model.

**UNIT II**

**Classes and Objects:** Nature of object, Relationships among objects, Nature of a Class, Relationship among Classes, Interplay of Classes and Objects, Identifying Classes and Objects, Importance of Proper Classification, Identifying Classes and Objects, Key abstractions and Mechanisms.

**UNIT III**

**Introduction to UML:** Why we model, Conceptual model of UML, Architecture, Classes, Relationships, Common Mechanisms, Class diagrams, Object diagrams.

**UNIT IV**

**Structural and Behavioral Modeling:** Advance Classes, Advance Relationships, Interfaces, Types & Roles, Packages, Interactions, Usecases, Usecase diagrams.

**UNIT V**

**Advanced Behavioral and Architectural modeling:** Activity diagrams, Events and Signals, State chart diagrams, Components and Component diagrams, Deployment & Deployment diagrams, Collaborations.

**Text Books:**

1. *“Object- Oriented Analysis And Design with Applications”, Grady BOOCH, Robert A. Maksimchuk, Michael W. ENGLE, Bobbi J. Young, Jim Conallen, Kellia Houston, 3<sup>rd</sup> edition, 2013, PEARSON*
2. *“The Unified Modeling Language User Guide”, Grady Booch, James Rumbaugh, Ivar Jacobson, 12<sup>th</sup> Impression, 2012, PEARSON.*

**Reference Books:**

1. *“Object-oriented analysis and design using UML”, Mahesh P. Matha, PHI*
2. *“Head first object-oriented analysis and design”, Brett D. McLaughlin, Gary Pollice, Dave West, O’Reilly*
3. *“Object-oriented analysis and design with the Unified process”, John W. Satzinger, Robert B. Jackson, Stephen D. Burd, Cengage Learning*
4. *“The Unified modeling language Reference manual”, James Rumbaugh, Ivar Jacobson, Grady Booch, Addison-Wesley*

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### (13A05603) DATA MINING

#### **Course Objective:**

- To learn the concepts of database technology evolutionary path which has led to the need for data mining and its applications
- To learn Data mining algorithms to build analytical applications

#### **Learning Outcome:**

After completing this course the student must demonstrate the knowledge and ability to:

- Apply preprocessing statistical methods for any given raw data.
- Select and apply proper Data mining algorithms to build analytical applications.
- Develop practical work of Data Mining techniques and design hypotheses based on the analysis to conceptualize a Data Mining Solution to practical problem.

#### **UNIT I**

**Introduction:** What is Data Mining, Motivating Challenges, The Origins of Data Mining, Data Mining Tasks. **Data:** Types of Data, Data Quality, Data Preprocessing, Measures of Similarity and Dissimilarity. **Exploring Data:** Summary Statistics, OLAP and Multidimensional Data Analysis

#### **UNIT II**

**Basic Concepts, Decision Trees, and Model Evaluation:** Preliminaries, General Approach to Solving a Classification Problem, Decision Tree Induction, Model Overfitting, Evaluating the Performance of a Classifier, Methods for Comparing Classifiers.

#### **UNIT III**

**Classification-Alternative techniques:** Rule-Based Classifier, Nearest-Neighbor Classifiers, Bayesian Classifiers, Artificial Neural Networks, Support Vector Machines, Ensemble Methods, Class Imbalance Problem, Multiclass Problem

#### **UNIT IV**

**Association Analysis- Basic Concepts and Algorithms:** Problem Definition, Frequent Item set Generation, Rule Generation, Compact Representation of Frequent Item sets, Alternative Methods for Generating Frequent Item sets, FP-Growth Algorithm, Evaluation of Association Patterns, Effect of Skewed Support Distribution

#### **UNIT V**

**Cluster Analysis- Basic Concepts and Algorithms:** Overview, k-means, Agglomerative Hierarchical Clustering, DBSCAN, Cluster Evaluation,

**Cluster Analysis-Additional Issues and Algorithms:** Characteristics of Data, Clusters, and Clustering Algorithms, Prototype-Based Clustering, Density-Based Clustering, Graph-Based Clustering-Minimum Spanning Tree (MST) Clustering, Chameleon, Scalable Clustering Algorithms-Scalability-General Issues and Approaches, BIRCH, CURE

#### **Text Books :**

1. *Introduction to Data Mining, Pang-Ning Tan, Vipin Kumar, Michael Steinbach, Pearson*
2. *Data Mining: Concepts and Techniques, Jiawei Han and Micheline Kamber, Morgan Kaufmann Publishers, Elsevier, Second Edition, 2006*

**Reference Books :**

1. *Data Mining Principles & Applications*, T.V. Suresh Kumar, B. Eswara Reddy, Jagadish S Kallimani, Elsevier
2. *Data Mining Techniques and Applications an Introduction*, Hongbo Du, Cengage Learning
3. *Data Mining Techniques*, Arun K Pujari, Second Edition, Universities Press
4. *Data Mining*, Pudi, Oxford University Press

## JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

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### (13A05604) WEB PROGRAMMING

#### Course Objective:

- Learn to access data bases using java
- Learn to communicate over a network using java
- Learn do design server side programs and access them from client side

#### Learning Outcome:

Upon completion of this course, students will receive:

- **Familiarity with WWW technical concepts:** IP addressing, routing, client-server interaction, and basic HTTP server functionality.
- **Exposure to basic Web Programming:** including HTML programming (manual and tool-assisted), JavaScript programming of reactive web pages elements.
- **Exposure to database programming using java**
- The necessary skills to write server side programs
- A solid foundation for further exploration of more advanced web programming technologies.

#### UNIT I

**Fundamentals:** Introduction to the Web, Web servers and Clients, Resources, URL and its Anatomy, Message Format, Persistent and Non-persistent connections, Web Caching, Proxy, Java and the Net, Java Network Classes and Interfaces, Looking up Internet Address, Client/Server programs, Socket programming, e-mail client, POP3 programs, Remote method invocation, Example

#### UNIT II

**HTML:** HTML and its Flavors, HTML basics, Elements, Attributes and Tags, Basic Tags, Advanced Tags, Frames, Images, Meta tag, Planning of Web page, Model and Structure for a Website, Designing Web pages, Multimedia content.

**Cascading style sheets:** Advantages, Adding CSS, Browser compatibility, CSS and page layout, Selectors

#### UNIT III

**JavaScript:** Introduction, Variables, Literals, Operators, Control structure, Conditional statements, Arrays, Functions, Objects, Predefined objects, Object hierarchy, Accessing objects, Events, Event handlers, Multiple windows and Frames, Form object and Element, Advanced JavaScript and HTML, Data entry and Validation, Tables and Forms, DHTML with JavaScript

#### UNIT IV

**Server side programming:** Internet programming paradigm, Sever-side programming, Languages for CGI, Applications, Server environment, Environment variables, CGI building blocks, CGI scripting using C, Shell script, Writing CGI program, CGI security, Alternatives and Enhancement to CGI, Server-side Java, Advantages over Applets, Servlet alternatives, Servlet strengths, Servlet architecture, Servlet life cycle, Generic and HTTPServlet, First Servlet, Passing parameters to Servlets, Retrieving parameters, Server-side include, Cookies, Filters, Problems with Servlet, Security issues, JSP and HTTP, JSP Engines, How JSP works, JSP and Servlet, Anatomy of a JSP page, JSP syntax, JSP components

#### UNIT V

**Sever side programming: continued:** Beans, Session tracking, Users passing control and data between pages, Sharing session and Application data, Database connectivity, JDBC drivers, Basic steps, Loading a driver, Making a connection, Execute and SQL statement, SQL statements, Retrieving the result, Getting database information, Scrollable and updatable result set, Result set metadata, Introduction to JavaBeans,

Bean builder, Advantages of Java Beans, BDK introspection, Properties, BeanInfo interface, Persistence, Customizer, JavaBeans API, EJB, Introduction to Struts Framework.

**Text Books :**

1. *Web Technologies, Uttam K. Roy, 1<sup>st</sup> edition 7<sup>th</sup> impression, 2012, Oxford Higher Education*

**Reference Books :**

1. *Java How to program, Paul deitel, Harvey deital, PHI*
2. *Introduction to Java Programming, Y.Daniel Liang, 6<sup>th</sup> Edition, Pearson Education, 2007*
3. *The J2EE Tutorial, Stephanie Bodoff et al, 2<sup>nd</sup> Edition, Pearson Education, 2004.*
4. *Web Technologies, Roy, Oxford University Press*
5. *Web Technologies, Srinivasan, Pearson Education, 2012*
6. *Java EE 5 for Beginners, Ivan Bayross, Sharanam Shah, Cynthia Bayrossand Vaishali Shai, SPD.*
7. *Programming the Worldwide Web, Robert W.Sebesta, 7<sup>th</sup> edition, 2009, Pearson Education*

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**(13A05605) SOFTWARE TESTING METHODOLOGIES**

**Course Objective:**

- *Basic software debugging methods.*
- *Various testing methodologies.*
- *The procedure for designing test cases.*
- *The significance of software testing*

**Learning Outcome:**

- *Understand the basic testing procedures.*
- *Generating test cases and test suites.*
- *Test the applications manually and by automation using different testing methods.*

**UNIT I**

**Introduction:** Purpose of Testing, Dichotomies, Model for Testing, Consequences of Bugs, Taxonomy of Bugs.

**Flow graphs and Path testing:** Basics Concepts of Path Testing, Predicates, Path Predicates and Achievable Paths, Path Sensitizing, Path Instrumentation, Application of Path Testing.

**UNIT II**

**Transaction Flow Testing:** Transaction Flows, Transaction Flow Testing Techniques.

**Dataflow testing:** Basics of Dataflow Testing, Strategies in Dataflow Testing, Application of Dataflow Testing.

**UNIT III**

**Domain Testing:** Domains and Paths, Nice & Ugly Domains, Domain testing, Domains and Interfaces Testing, Domain and Interface Testing, Domains and Testability.

**UNIT IV**

**Paths, Path products and Regular expressions:** Path Products & Path Expression, Reduction Procedure, Applications, Regular Expressions & Flow Anomaly Detection.

**Logic Based Testing:** Overview, Decision Tables, Path Expressions, KV Charts, Specifications.

**UNIT V:**

**State, State Graphs and Transition Testing:** State Graphs, Good & Bad State Graphs, State Testing, Testability Tips.

**Graph Matrices and Application:** Motivational Overview, Matrix of Graph, Relations, Power of a Matrix, Node Reduction Algorithm, Building Tools. (Student should be given an exposure to a tool like JMeter or Win-runner).

**Text Books :**

1. *Software testing techniques – Boris Beizer, Dreamtech, second edition.*
2. *Software Testing- Yogesh Singh, Camebridge*

**Reference Books :**

1. *The craft of software testing - Brian Marick, Pearson Education.*
2. *Software Testing, 3<sup>rd</sup> edition, P.C. Jorgensen, Aurbach Publications (Dist.by SPD).*
3. *Software Testing, N.Chauhan, Oxford University Press.*
4. *Introduction to Software Testing, P.Ammann&J.Offutt, Cambridge Univ.Press.*
5. *Effective methods of Software Testing, Perry, John Wiley, 2<sup>nd</sup> Edition, 1999.*
6. *Software Testing Concepts and Tools, P.Nageswara Rao, dreamtech Press.*

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**(13A05606) ADVANCED COMPUTER ARCHITECTURE**

**Course Objective:**

- *Discuss the concept of parallel processing and the relationship between parallelism and performance*
- *Understand the organization of computer structures that can be electronically configured and reconfigured*
- *Discuss the performance advantages that multithreading can offer along with the factors that make it difficult to derive maximum benefits from this approach*

**Learning Outcome:**

- *Realize Parallelism and Parallel architectures*
- *Ability to use Instruction Level Parallelism*
- *Ability to use Thread level parallelism*

**UNIT I**

Evolution of Computer Architecture, System Attributes to performance; Shared Memory Multiprocessors, Distributed Memory Multiprocessors, A Taxonomy of MIMD Computers; architecture of Vector Super computers, operational model of SIMD computer, PRAM models and PRAM variants.

Conditions of Parallelism- data and resource dependencies, hardware and software parallelism, Program partitioning and Scheduling- grain sizes and latency, grain packing and scheduling, static multi processor scheduling, Program flow mechanisms- control flow vs data flow, demand driven mechanisms, comparison of flow mechanisms, System interconnect architectures- network properties and routing, static and dynamic connection networks

**UNIT II**

Principles of scalable performances- performance metrics and measures- parallelism profile in programs, mean performance, efficiency, utilization and quality, benchmarks and performance measures, characteristics of parallel processing applications, Speed up performance laws- Amdahl's law, Gustafson's law, memory bounded speed up model, Scalability metrics and goals,

Bus systems- back plane bus specification, Addressing and Timing protocols, Arbitration, transaction and interrupt, IEEE future bus standard requirement set, Shared memory organizations- Interleaved memory organization, band width and fault tolerance, memory allocation schemes, Atomicity and event ordering

**UNIT III**

Linear Pipeline Processors- asynchronous and synchronous models, clocking and timing control, speedup, efficiency, and throughput, Non linear pipeline processors- reservation and latency analysis, collision free scheduling, pipeline schedule optimization, Instruction pipe line design- instruction execution phases, mechanisms for instruction pipelining, dynamic instruction scheduling, branch handling techniques, static arithmetic pipelines.

Hierarchical bus system, cross bar switch and multiport memory, multistage and combining networks, multistage and combining networks, The cache coherence problem, message passing mechanism- message routing schemes, deadlock virtual channels, flow control strategies, multicast routing algorithms

**UNIT IV**

Vector processing principles- vector instruction types, vector access memory schemes, early super computers, Multi vector multiprocessors- performance directed design rules, architecture of Cray and MPP, Compound vector operations, vector loops and chaining, SIMD computer organizations



## **UNIT V**

Latency-hiding techniques- shared virtual memory, prefetching techniques, distributed coherent caches, scalable coherence interface, relaxed memory consistency, principles of multithreading and context switching policies,

MPD architecture, The Tera multiprocessor system, Data flow computer architecture

### ***Text Books :***

1. *KAI Hwang & Naresh Jotwani, "Advanced Computer Architecture- Parallelism, Scalability, Programmability" Second Edition, Mc Graw Hill Publishing*

### ***Reference Books :***

1. *Hennesy Patterson, "Computer Architecture- A Quantitative Approach" Fifth Edition, Elsevier*
2. *Kai Hwang, "Advanced Computer Architecture- Parallelism, Scalability, Programmability", TMH.*
3. *Computer Architecture, Concepts and Evolutions, Garrit A Blaauw, PEA*

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**(13A05607) UNIFIED MODELING LANGUAGE AND DATA MINING LAB**

**UML PROGRAMS**

UML diagrams to be developed are:

1. Use Case Diagram.
2. Class Diagram.
3. Sequence Diagram.
4. Collaboration Diagram.
5. State Diagram
6. Activity Diagram.
7. Component Diagram
8. Deployment Diagram.
9. Test Design.

**Problems that may be considered are**

1. College information system
2. Hostel management
3. ATM system

**Data Mining Lab**

Task 1: Credit Risk Assessment

**Description:** The business of banks is making loans. Assessing the credit worthiness of an applicant is of crucial importance. You have to develop a system to help a loan officer decide whether the credit of a customer is good, or bad. A bank's business rules regarding loans must consider two opposing factors. On the one hand, a bank wants to make as many loans as possible. Interest on these loans is the banks profit source. On the other hand, a bank cannot afford to make too many bad loans. Too many bad loans could lead to the collapse of the bank. The bank's loan policy must involve a compromise: not too strict, and not too lenient.

To do the assignment, you first and foremost need some knowledge about the world of credit. You can acquire such knowledge in a number of ways.

1. Knowledge Engineering. Find a loan officer who is willing to talk. Interview her and try to represent her knowledge in the form of production rules.
2. Books. Find some training manuals for loan officers or perhaps a suitable textbook on finance. Translate this knowledge from text form to production rule form.
3. Common sense. Imagine yourself as a loan officer and make up reasonable rules which can be used to judge the credit worthiness of a loan applicant.
4. Case histories. Find records of actual cases where competent loan officers correctly judged when, and when not to, approve a loan application.

**The German Credit Data:**

Actual historical credit data is not always easy to come by because of confidentiality rules. Here is one such dataset, consisting of 1000 actual cases collected in Germany. Credit dataset (original) Excel spreadsheet version of the German credit data.

In spite of the fact that the data is German, you should probably make use of it for this assignment. (Unless you really can consult a real loan officer !)

A few notes on the German dataset

- DM stands for Deutsche Mark, the unit of currency, worth about 90 cents Canadian (but looks and acts like a quarter).
- owns\_telephone. German phone rates are much higher than in Canada so fewer people own telephones.
- foreign\_worker. There are millions of these in Germany (many from Turrkey). It is very hard to get German citizenship if you were not born of German parents.

- There are 20 attributes used in judging a loan applicant. The goal is to classify the applicant into one of two categories, good or bad.

**Subtasks: (Turn in your answers to the following tasks)**

1. List all the categorical (or nominal) attributes and the real-valued attributes separately. (5 marks)
2. What attributes do you think might be crucial in making the credit assessment? Come up with some simple rules in plain English using your selected attributes. (5 marks)
3. One type of model that you can create is a Decision Tree - train a Decision Tree using the complete dataset as the training data. Report the model obtained after training. (10 marks)
4. Suppose you use your above model trained on the complete dataset, and classify credit good/bad for each of the examples in the dataset. What % of examples can you classify correctly? (This is also called testing on the training set) Why do you think you cannot get 100 % training accuracy? (10 marks)
5. Is testing on the training set as you did above a good idea? Why or Why not? (10 marks)
6. One approach for solving the problem encountered in the previous question is using cross-validation? Describe cross-validation, briefly. Train a Decision Tree again using cross-validation and report your results. Does your accuracy increase/decrease? Why? (10 marks)
7. Check to see if the data shows a bias against "foreign workers" (attribute 20), or "personal-status" (attribute 9). One way to do this (perhaps rather simple minded) is to remove these attributes from the dataset and see if the decision tree created in those cases is significantly different from the full dataset case which you have already done. To remove an attribute you can use the preprocess tab in Weka's GUI Explorer. Did removing these attributes have any significant effect? Discuss. (10 marks)
8. Another question might be, do you really need to input so many attributes to get good results? Maybe only a few would do. For example, you could try just having attributes 2, 3, 5, 7, 10, 17 (and 21, the class attribute (naturally)). Try out some combinations. (You had removed two attributes in problem 7. Remember to reload the arff data file to get all the attributes initially before you start selecting the ones you want.) (10 marks)
9. Sometimes, the cost of rejecting an applicant who actually has a good credit (case 1) might be higher than accepting an applicant who has bad credit (case 2). Instead of counting the misclassifications equally in both cases, give a higher cost to the first case (say cost 5) and lower cost to the second case. You can do this by using a cost matrix in Weka. Train your Decision Tree again and report the Decision Tree and cross-validation results. Are they significantly different from results obtained in problem 6 (using equal cost)? (10 marks)
10. Do you think it is a good idea to prefer simple decision trees instead of having long complex decision trees? How does the complexity of a Decision Tree relate to the bias of the model? (10 marks)
11. You can make your Decision Trees simpler by pruning the nodes. One approach is to use Reduced Error Pruning - Explain this idea briefly. Try reduced error pruning for training your Decision Trees using cross-validation (you can do this in Weka) and report the Decision Tree you obtain?  
Also, report your accuracy using the pruned model. Does your accuracy increase? (10 marks)
- 12.(Extra Credit): How can you convert a Decision Trees into "if-then-else rules"?. Make up your own small Decision Tree consisting of 2-3 levels and convert it into a set of rules. There also exist different classifiers that output the model in the form of rules - one such classifier in Weka is rules. PART, train this model and report the set of rules obtained. Sometimes just one attribute can be good enough in making the decision, yes, just one! Can you predict what attribute that might be in this dataset? One R classifier uses a single attribute to make decisions (it chooses the attribute based on minimum error). Report the rule obtained by training a one R classifier. Rank the performance of j48, PART and oneR. (10 marks)

**Task Resources:**

- Andrew Moore's Data Mining Tutorials (See tutorials on Decision Trees and Cross Validation)
- Decision Trees (Source: Tan, MSU)
- Tom Mitchell's book slides (See slides on Concept Learning and Decision Trees)
- Weka resources:
  - Introduction to Weka (html version) (download ppt version)
  - Download Weka

- Weka Tutorial
- ARFF format
- Using Weka from command line

#### Task 2: Hospital Management System

Data Warehouse consists Dimension Table and Fact Table. REMEMBER The following

#### Dimension

The dimension object (Dimension):

\_ Name  
\_ Attributes (Levels) , with one primary  
key \_ Hierarchies

One time dimension is must.

About Levels and Hierarchies

Dimension objects (dimension) consist of a set of levels and a set of hierarchies defined over those levels. The levels represent levels of aggregation. Hierarchies describe parent-child relationships among a set of levels.

For example, a typical calendar dimension could contain five levels. Two hierarchies can be defined on these levels:

H1: YearL > QuarterL > MonthL > WeekL > DayL

H2: YearL > WeekL > DayL

The hierarchies are described from parent to child, so that Year is the parent of Quarter, Quarter the parent of Month, and so forth.

#### About Unique Key Constraints

When you create a definition for a hierarchy, Warehouse Builder creates an identifier key for each level of the hierarchy and a unique key constraint on the lowest level (Base Level)

Design a Hospital Management system data warehouse (TARGET) consists of Dimensions Patient, Medicine, Supplier, Time. Where measures are \_ NO UNITS', UNIT PRICE.

Assume the Relational database (SOURCE) table schemas as follows

TIME (day, month, year),

PATIENT (patient\_name, Age, Address, etc.,)

MEDICINE ( Medicine\_Brand\_name, Drug\_name, Supplier, no\_units, Uinit\_Price, etc.,) SUPPLIER :( Supplier\_name, Medicine\_Brand\_name, Address, etc., )

If each Dimension has 6 levels, decide the levels and hierarchies, Assume the level names suitably.

Design the Hospital Management system data warehouse using all schemas. Give the example 4-D cube with assumption names.

#### Reference Books :

1. *Object- Oriented Analysis And Design with Applications, Third Edition.* Grady BOOCH, Robert A. Maksimchuk, Michael W. ENGLE, Bobbi J. Young, Ph.D, Jim Conallen, Kellia. Houston, Pearson
2. *The Unified Modeling Language User Guide,* Grady Booch, James Rumbaugh, Ivar Jacobson, Pearson
3. *Introduction to Data Mining,* Pang-Ning Tan, Vipin Kumar, Michael Steinbach, Pearson
4. *Data Mining: Concepts and Techniques,* Jiawei Han and Micheline Kamber, Morgan Kaufmann Publishers, Elsevier, Second Edition, 2006

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR**

**B.Tech. III - I Sem.**

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**(13A05608) WEB PROGRAMMING LAB**

- 1) Write a Java program which stores the user login information in database in a server, creates user interface for inserting, deleting, retrieving information from the database, accepts user login information and verifies it.
- 2) Write a JAVA program which establishes a connection between client and server and transfers data. Transfer the data without establishing the connection.
- 3) Write a Java Program to create an Employee class with the data members Emp\_id, name, Department and create a member function to get the employee information, display the details.
- 4) Write a java program to create a package for simple arithmetic operations
- 5) Write a Java Program to create a user defined Exception called —StringNotMatchException when the user entered input is not equal to —INDIA
- 6) Write a HTML to create user registration form with following constraints; Validate the registration, user login, user profile and payment by credit card pages using Java Script
- 7) Create and save an XML document at the server, which contains 10 users information. Write a program which takes User ID as input and returns the user details by taking the user information from the XML document.
- 8) Write a XHTML form for Employee Information like Emp\_id, Name, Department Name, Phone, E-mail. using java script check the validation for each Fields(The First Character of Emp\_id character followed by number, name should accept 20 characters, phone max 8 digits, email)
- 9) Write a Java Servlet Program to display the Current time on the server.
- 10) To write html and servlet to demonstrate invoking a servlet from a html
- 11) Write a Java servlet program to change the Background color of the page by the color selected by the user from the list box.
- 12) Write a Java servlet to get the personal details about the user(Like name, Address, City, Age, E-mail id) and check whether the user is Eligible to vote or not.
- 13) Write a Java servlet Program to create a Cookie and keep it alive on the client for 30 minutes.
- 14) Write a java servlet program to display the various client information like Connection, Host, Accept-Encoding, User Agent.
- 15) To write java servlet programs to conduct online examination and to display student mark list available in a database
- 16) Write a Java servlet Program to implement the Book Information using JDBC
- 17) Write a Java Servlet Program to create a Session and display the various information like, Last accessed time, Modified time, Expiration)
- 18) Write a JSP Program to Display the number of visitors visited the page.
- 19) Write a JSP Program to implement the Book Information using Database.
- 20) Write a JSP Program to implement the Telephone Directory

**Reference Books :**

1. *Web Technologies, Uttam K Roy, Oxford University Press*
2. *The Complete Reference PHP – Steven Holzner, Tata McGraw-Hill*
3. *Web Programming, building internet applications, Chris Bates 2<sup>nd</sup> edition, Wiley Dreamtech*
4. *Java Server Pages –Hans Bergsten, SPD O'Reilly*
5. *Java Script, D.Flanagan, O'Reilly, SPD.*
6. *Beginning Web Programming-Jon Duckett WROX.*
7. *Programming World Wide Web, R.W.Sebesta, Fourth Edition, Pearson.*
8. *Internet and World Wide Web – How to program, Dietel and Nieto, Pearson*

## JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

B.Tech. IV-I Sem.

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### (13A05701) COMPUTER GRAPHICS AND MULTIMEDIA

#### **Course Objective:**

- To know about different graphics hardware
- To study different techniques and algorithms related to Computer Graphics.
- To make the students understand the creation, storage, and manipulation of models and images of objects.
- Understand the basic concepts of multimedia and gain the skills required to work with them

#### **Learning Outcome:**

- Ability to develop programs to control the content, structure and appearance of objects.
- Ability to design, organize and produce multimedia projects of all kinds

#### **UNIT I**

**Introduction:** Computer-Aided design, Presentation graphics, Computer Art, Entertainment, Education and Training, Visualization, Image processing, Graphics user interfaces.

**Graphics Systems:** Video display devices, Raster scan systems, Random scan systems, Graphics monitors and workstations, Input devices, Hard-copy devices, Graphics software

#### **UNIT II**

**Basic Graphic algorithms:** Overview, Scan converting lines, Scan converting Circles, Scan converting Ellipse, Filling rectangles, Filling polygons, Filling ellipse Arcs, Pattern filling, Clipping lines, Clipping circles and ellipse, Clipping polygons, Generating characters.

**Geometrical Transformations:** 2D Transformation, Homogeneous co-ordinates and matrix representation of 2D transformations, Composition of 2D transformations, The window-to-view port transformation, Efficiency.

**3D Transformations:** Matrix representation of 3D transformations, Composition of 3D transformations, Transformations as a change in coordinate system.

#### **UNIT III**

**Viewing in 3D:** Projections, Specifying an arbitrary 3D view, Examples of 3D viewing.

**Curves and surfaces:** Polygon meshes, Parametric cubic curves: Hermite curves, Bezier curves, Uniform non rational B-splines, Non uniform Non rational B-splines

Parametric Bicubic surfaces: Hermite surfaces, Bezier surfaces, B-spline surfaces

**Visual realism:** Why realism, Fundamental difficulties, Rendering techniques for line drawings, Rendering techniques for shaded images, Dynamics.

#### **UNIT IV**

**Visible surface determination:** Functions of two variables, Techniques for efficient visible surface algorithms, Algorithms for visible-line determination, The z-buffer algorithm, List priority algorithms, Scan line algorithms.

**Illumination and Shading:** Illumination models, Shading models for polygons, Surface detail, Shadows, Transparency.

#### **UNIT V**

**Multimedia:** Where to use multimedia, Text: The power of meaning, About fonts and faces, Images: Before you start to create, Making still images, color, Sound: The power of sound, Digital audio, MIDI Audio, MIDI Vs Digital audio, Multimedia system sounds, Audio File formats, Animation, Video: Using video, How video works and is displayed, Digital video containers

**Text Books :**

1. *Computer Graphics C version, Donald Hearn and M. Pauline Baker, 2<sup>nd</sup> edition, 2011, Pearson.*
2. *Computer Graphics Principles and Practice in C, Foley, Dam, Feiner, John, 2<sup>nd</sup> Edition, 2013, Pearson.*
3. *Multimedia: Making It Work, Tay Vaughan, 8<sup>th</sup> Edition, 2011, Tata McGrawHill Edition*

**Reference Books :**

1. *Computer Graphics with Virtual Reality System, Rajesh K.Mourya, Wiley India.*
2. *Principles of Computer Graphics, Theory and Practice, Shalini, Govil Pai, Springer.*
3. *Multimedia Applications, Relp Stteinmetz, Kolara Nahrstedt, Springer International Edition.*
4. *Principles of Multimedia, Ranjan Parckh, Second Edition, Mc Graw Hill.*

## JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

B.Tech. IV-I Sem.

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### (13A05702) CRYPTOGRAPHY & NETWORK SECURITY

#### Course Objective:

- Extensive, thorough and significant understanding of the concepts, issues, principles and theories of computer network security
- Identifying the suitable points for applying security features for network traffic
- Understanding the various cryptographic algorithms and implementation of the same.
- Understanding the various attacks, security mechanisms and services

#### Learning Outcome:

At the end of the course the students will be able to:

- Protect the network from both internal and external attacks
- Understand and implement various public and private key cryptographic algorithms
- Design of new security approaches

#### UNIT I

Computer Security concepts, The OSI Security Architecture, Security attacks, Security services and Security mechanisms, A model for Network Security, Classical encryption techniques- symmetric cipher model, substitution ciphers, transposition ciphers, Steganography, Modern Block ciphers, Modern Stream ciphers.

**Modern Block Ciphers:** Block ciphers principles, Data encryption standard (DES), Strength of DES, linear and differential cryptanalysis, block cipher modes of operations, AES, RC4

#### UNIT II

**Introduction to Number theory :** Integer Arithmetic, Modular Arithmetic, Matrices, Linear Congruence, Algebraic Structures,  $GF(2^n)$  Fields, Primes, Primarily Testing, Factorization, Chinese remainder Theorem, Quadratic Congruence, Exponentiation and Logarithm.

**Public-key cryptography :**Principles of public-key cryptography, RSA Algorithm, Diffie-Hellman Key Exchange, ElGamal cryptographic system, Elliptic Curve Arithmetic, Elliptic curve cryptography

#### UNIT III

**Cryptographic Hash functions:** Applications of Cryptographic Hash functions, Requirements and security, Hash functions based on Cipher Block Chaining, Secure Hash Algorithm (SHA)

**Message Authentication Codes:** Message authentication Requirements, Message authentication functions, Requirements for Message authentication codes, security of MACs, HMAC, MACs based on Block Ciphers, Authenticated Encryption

**Digital Signatures :** RSA with SHA & DSS

#### UNIT IV

**Key Management and distribution:** Symmetric key distribution using Symmetric Encryption, Symmetric key distribution using Asymmetric, Distribution of Public keys, X.509 Certificates, Public key Infrastructure.

**User Authentication:** Remote user Authentication Principles, Remote user Authentication using Symmetric Encryption, Kerberos, Remote user Authentication using Asymmetric Encryption, Federated Identity Management

**Electronic mail security:** Pretty Good Privacy (PGP), S/MIME

#### UNIT V

**Security at the Transport Layer(SSL and TLS) :** SSL Architecture, Four Protocols, SSL Message Formats, Transport Layer Security, HTTPS, SSH

**Security at the Network layer (IPSec):** Two modes, Two Security Protocols, Security Association, Security Policy, Internet Key Exchange.



**System Security:** Description of the system, users, Trust and Trusted Systems, Buffer Overflow and Malicious Software, Malicious Programs, worms, viruses, Intrusion Detection System(IDS), Firewalls

**Text Books :**

1. *Cryptography and Network Security: Principals and Practice, William Stallings, Fifth Edition, Pearson Education.*
2. *Cryptography and Network Security, Behrouz A. Frouzan and Debdeep Mukhopadhyay, 2<sup>nd</sup> edition, Mc Graw Hill Education*

**Reference Books :**

1. *Network Security and Cryptography, Bernard Menezes , Cengage Learning.*
2. *Cryptography and Security, C.K. Shymala, N. Harini and Dr. T.R. Padmanabhan, Wiley-India.*
3. *Applied Cryptography, Bruce Schneier, 2<sup>nd</sup> edition, John Wiley & Sons.*
4. *Cryptography and Network Security, Atul Kahate, TMH.*
5. *Introduction to Cryptography, Buchmann, Springer.*
6. *Number Theory in the Spirit of Ramanujan, Bruce C.Berndt, University Press*
7. *Introduction to Analytic Number Theory, Tom M.Apostol, University Press*

## JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

**B.Tech. IV-I Sem.**

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### (13A05703) SERVICE ORIENTED ARCHITECTURE

#### **Course Objective:**

- Understand SOA and evolution of SOA.
- Understand web services and primitive, contemporary SOA.
- Understand various service layers.
- Understand service-oriented analysis and design based on guidelines

#### **Learning Outcome:**

- Model service candidate derived from existing business documentation.
- Design the composition of SOA.
- Design application services for technology abstraction

#### **UNIT I**

**Introducing SOA:** Fundamental SOA, Common Characteristics of Contemporary SOA, Common Tangible Benefits of SOA.

**The Evolution of SOA:** An SOA Timeline, The Continuing Evolution of SOA, The Roots of SOA.

#### **UNIT II**

**Web Services and Primitive SOA:** Web Services Framework, Services, Service Descriptions, Messaging.

**Web Services and Contemporary SOA (Part-I):** Message Exchange Patterns, Service Activity, Coordination, Atomic Transactions, Business Activities, Orchestration, Choreography.

#### **UNIT III**

**Web Services and Contemporary SOA (Part-II):** Addressing, Reliable Messaging, Correlation, Policies, Metadata Exchange, Security, Notification and Eventing.

#### **UNIT IV**

**Principles of Service-Oriented Architecture:** Service-Oriented Architecture and the Enterprise, Anatomy of Service-Oriented Architecture, Common Principles of Service-Oriented Architecture, How Service-Oriented Architecture Principles Inter-relate, Service-Oriented Architecture and Object-Oriented Architecture, Native Web Service Support for Service-Oriented Architecture Principles.

**Service Layers:** Service-Oriented Architecture and Contemporary SOA, Service Layer Abstraction, Application Service Layer, Business Service Layer, Orchestration Service Layer, Agnostic Services.

#### **UNIT V**

**Service-Oriented Analysis:** Introduction to Service-Oriented Analysis, Benefits of a Business-Centric SOA, Deriving Business Services, Service Modeling, Service Modeling Guidelines.

**Service-Oriented Design:** Introduction to Service-Oriented Design, WSDL-related XML Schema Language Basics, WSDL Language Basics, SOAP Language Basics, Service Interface Design Tools.

#### **Text Books :**

1. *Service Oriented Architecture: Concepts, Technology, and Design*, Thomas Erl, Pearson Education.

#### **Reference Books :**

1. *SOA using Java Web Services*, Mark D Hansen, Prentice Hall Publication.

2. *Applied SOA*, Michael Rosen & et al., Wiley Publication.

3. *SOA based Enterprise Integration*, Roshen, TMH Publication.

4. *Service Oriented Computing*, Muninder Singh & Michael Huhns, Wiley Publication.

5. *Implementing SOA Using Java EE*, B.V.Kumar, Prakash Narayan & Tony Ng, Pearson Education

6. *XML and Web Services*, Ron Schmelzer et al. Pearson Education.

7. *SOA Governance*, William A. Brown, Robert G. Laird, Clive Gee & Tilak Mitra, Pearson Education.

## JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

B.Tech. IV-I Sem.

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### (13A05704) MOBILE APPLICATION DEVELOPMENT

#### Course Objective:

- To introduce the Android technology and its application.
- Design & program real working education based mobile application projects.
- Become familiar with common mobile application technologies and platforms; open files, save files, create and program original material, integrate separate files into a mobile application project, create and edit audio sound effects & music.

#### Learning Outcome:

At the end of the course students will be assessed to determine whether they are able to

- Describe the limitations and challenges of working in a mobile and wireless environment as well as the commercial and research opportunities presented by these technologies
- Describe and apply the different types of application models/architectures used to develop mobile software applications
- Describe the components and structure of a mobile development frameworks (Android SDK and Eclipse Android Development Tools (ADT)) and learn how and when to apply the different components to develop a working system
- Describe and apply software patterns for the development of the application models described above
- Describe and work within the capabilities and limitations of a range of mobile computing devices
- Design, implement and deploy mobile applications using an appropriate software development environment

#### UNIT I

**J2ME Overview:** Java 2 Micro Edition and the World of Java, Inside J2ME, J2ME and Wireless Devices. Small computing Technology: Wireless Technology, Radio Data Networks, Microwave Technology, Mobile Radio Networks, Messaging, Personal Digital Assistants.

**J2ME Architecture and Development Environment:** J2ME Architecture, Small Computing Device Requirements, Run – Time Environment, MIDlet programming, Java Language for J2ME, J2ME Software Development Kits, Hello World J2ME Style, Multiple MIDlets in a MIDlet Suite, J2ME wireless Toolkit.

#### UNIT II

**J2ME Best Practices and Patterns:** The Reality of Working in a J2ME World, Best Practices, **Commands, Items, and Event Processing:** J2ME User Interfaces, Display Class, The Palm OS Emulator, Command Class, Item Class, Exception Handling.

**High – Level Display:** Screens, Screen Class, Alert Class, Form Class, Item Class, List Class, Text Box Class, Ticker Class.

#### UNIT III

**Low Level Display:** The Canvas, User Interactions, Graphics, Clipping Regions, Animation. **Record Management System:** Record Storage, Writing and Reading Records, Record Enumeration, Sorting Records, Searching Records, Record Listener.

#### UNIT IV

**JDBC Objects:** The Concept of JDBC, JDBC Driver Types, JDBC Packages. Overview of the JDBC process, Database Connection, Statement Objects, Result Set, Transaction Processing, Metadata, Data Types, Exceptions.

**JDBC and Embedded SQL:** Model programs, Tables, Indexing, Inserting Data into Tables, Selecting Data from a Table, Updating Tables, Deleting Data from a table.

**Introduction Android Programming:** What is Android, Activities, Linking Activities Using Intents, Fragments, Calling Built – in Applications using Intents, Displaying Notifications

## **UNIT V**

**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.

**Designing User Interface with Views:** Basic Views, Picker Views, Using List Views to Display Long Lists.

### ***Text Books :***

1. *J2ME: The Complete Reference*, James Keogh, TMH.
2. *Beginning Android 4 Application Development*, Wei-Meng Lee, Wiley India

### ***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.

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR**

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**(13A05705) INFORMATION RETRIEVAL SYSTEMS  
(Elective-II)**

**Course Objective:**

- To learn the different models for information storage and retrieval
- To learn about the various retrieval utilities
- To understand indexing and querying in information retrieval systems
- To expose the students to the notions of structured and semi structured data
- To learn about web search

**Learning Outcome:**

At the end of the course students will be assessed to determine whether they are able to

- store and retrieve textual documents using appropriate models
- use the various retrieval utilities for improving search
- do indexing and compressing documents to improve space and time efficiency
- formulate SQL like queries for unstructured data

**UNIT I**

**Introduction to Information Retrieval**

**Retrieval Strategies:** Vector space model, Probabilistic retrieval strategies: Simple term weights, Non binary independence model, Language Models

**UNIT II**

**Retrieval Utilities:** Relevance feedback, Clustering, N-grams, Regression analysis, Thesauri.

**UNIT III**

**Retrieval Utilities:** Semantic networks, Parsing.

**Cross-Language Information Retrieval:** Introduction, Crossing the language barrier.

**UNIT IV**

**Efficiency:** Inverted index, Query processing, Signature files, Duplicate document detection

**UNIT V**

**Integrating Structured Data and Text:** A Historical progression, Information retrieval as a relational application, Semi-structured search using a relational schema.

**Distributed Information Retrieval:** A Theoretical model of distributed retrieval, Web search.

**Text Books :**

1. *Information Retrieval – Algorithms and Heuristics*, David A. Grossman, Ophir Frieder, 2<sup>nd</sup> Edition, 2012, Springer, (Distributed by Universities Press)

**Reference Books :**

1. *Modern Information Retrieval Systems*, Yates, Pearson Education
2. *Information Storage and Retrieval Systems*, Gerald J Kowalski, Mark T Maybury, Springer, 2000
3. *Mining the Web : Discovering Knowledge from Hypertext Data*, Soumen Chakrabarti Morgan-Kaufmann Publishers, 2002
4. *An Introduction to Information Retrieval*, Christopher D. Manning, Prabhakar Raghavan, Hinrich Schütze, , Cambridge University Press, Cambridge, England, 2009

## JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

B.Tech. IV-I Sem.

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### (13A05706) HUMAN COMPUTER INTERACTION (Elective-II)

#### Course Objective:

- Gain an overview of Human-Computer Interaction (HCI), with an understanding of user interface design.
- Become familiar with the vocabulary associated with sensory and cognitive systems as relevant to task performance by humans
- Be able to apply models from cognitive psychology to predicting user performance in various human-computer interaction tasks and recognize the limits of human performance as they apply to computer operation
- Be familiar with a variety of both conventional and non-traditional user interface paradigms

#### Learning Outcome:

At the end of the course students will be assessed to determine whether they are able to

- Find innovative ways of interacting with computers
- Help the disabled by designing non-traditional ways of interacting
- Use cognitive psychology in the design of devices for interaction

#### UNIT I

**Introduction: Importance of user Interface:** Definition, Importance of Good Design, Benefits of Good Design, A Brief History of Screen Design.

**The Graphical User Interface :** Popularity of Graphics, the Concept of Direct Manipulation, Graphical System, Characteristics,

**Web User** – Interface Popularity, Characteristics- Principles of User Interface.

#### UNIT II

**Design process** – Understanding how people interact with computers, importance of human characteristics human consideration, Human interaction speeds, and understanding business functions.

**Screen Designing:** Design goals – Screen meaning and purpose, organizing screen elements, ordering of screen data and content – screen navigation and flow – Visually pleasing composition – amount of information – focus and emphasis – presentation information simply and meaningfully – information retrieval on web – statistical graphics – Technological consideration in interface design

#### UNIT III

**System menus:** Structures of Menus, Functions of Menus, Content of Menus, Kinds of Graphical menus

**Windows:** Window characteristics, Components of a window, Window presentation styles, Types of windows, Window management

#### UNIT IV

**Controls:** Characteristics of device based controls, Selecting the proper device based controls, Operable controls, Text Entry/Read-only controls, Selection controls, Combination Entry/selection controls, Selecting the proper controls

#### UNIT V

**Graphics:** Icons, Multimedia, Colour-what is it, Colour uses, Colour and Human vision, Choosing colours

**Testing:** The purpose and importance of usability testing, Scope of testing, Prototypes, Kinds of Tests, Developing and conducting the test

**Text Books :**

1. *The essential guide to user interface design, Wilbert O Galitz, 2<sup>nd</sup> edition, 2013, Wiley.*

**Reference Books :**

1. *Designing the user interface, 3rd Edition Ben Shneidermann, Pearson Education Asia.*
2. *Human –Computer Interaction, D.R.Olsen, Cengage Learning.*
3. *Human – Computer Interaction, I.Scott Mackenzie, Elsevier Publishers.*
4. *Interaction Design, Prece, Rogers, Sharps, Wiley Dreamtech.*
5. *User Interface Design, Soren Lauesen, Pearson Education.*
6. *Human –Computer Interaction, Smith - Atakan, Cengage Learning*

## JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

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### (13A05707) COMPUTER FORENSICS (Elective-II)

#### Course Objective:

- To understand the fundamentals in the field of Computer Forensics
- Correctly define and cite appropriate instances for the application of computer forensics
- Correctly collect and analyze computer forensic evidence
- Identify the essential and up-to-date concepts, algorithms, protocols, tools, and methodology of Computer Forensics

#### Learning Outcome:

At the end of the course students will be assessed to determine whether they are able to

- Explain and apply the concepts of computer investigations.
- Identify and apply current practices for processing crime and incident scenes.
- Explain and apply digital evidence controls.
- Identify and apply current practices for data discovery recovery and acquisition.
- Demonstrate the recovery of image files.
- Conduct basic network forensic analysis.
- Perform e-mail investigations.
- Act as expert witness and report results of investigations.

#### UNIT I

**Computer Forensics Fundamentals:** What is Computer Forensics?, Use of Computer Forensics in Law Enforcement, Computer Forensics Assistance to Human Resources/Employment Proceedings, Computer Forensics Services, Benefits of Professional Forensics Methodology, Steps taken by Computer Forensics Specialists

**Types of Computer Forensics Technology:** Types of Military Computer Forensic Technology, Types of Law Enforcement – Computer Forensic Technology – Types of Business Computer Forensic Technology

**Computer Forensics Evidence and Capture:** Data Recovery Defined – Data Back-up and Recovery – The Role of Back-up in Data Recovery – The Data-Recovery Solution

#### UNIT II

**Evidence Collection and Data Seizure:** Why Collect Evidence? Collection Options – Obstacles – Types of Evidence – The Rules of Evidence – Volatile Evidence – General Procedure – Collection and Archiving – Methods of Collection – Artifacts – Collection Steps – Controlling Contamination: The Chain of Custody

**Duplication and Preservation of Digital Evidence:** Preserving the Digital Crime Scene – Computer Evidence Processing Steps – Legal Aspects of Collecting and Preserving Computer Forensic Evidence

**Computer Image Verification and Authentication:** Special Needs of Evidential Authentication – Practical Consideration – Practical Implementation

#### UNIT III

**Computer Forensics analysis and validation:** Determining what data to collect and analyze, validating forensic data, addressing data-hiding techniques, performing remote acquisitions

**Network Forensics:** Network forensics overview, performing live acquisitions, developing standard procedures for network forensics, using network tools, examining the honeynet project.

**Processing Crime and Incident Scenes:** Identifying digital evidence, collecting evidence in private-sector incident scenes, processing law enforcement crime scenes, preparing for a search, securing a computer incident or crime scene, seizing digital evidence at the scene, storing digital evidence, obtaining a digital hash, reviewing a case



## UNIT IV

**Current Computer Forensic tools:** evaluating computer forensic tool needs, computer forensics software tools, computer forensics hardware tools, validating and testing forensics software

**E-Mail Investigations:** Exploring the role of e-mail in investigation, exploring the roles of the client and server in e-mail, investigating e-mail crimes and violations, understanding e-mail servers, using specialized e-mail forensic tools

**Cell phone and mobile device forensics:** Understanding mobile device forensics, understanding acquisition procedures for cell phones and mobile devices

## UNIT V

**Working with Windows and DOS Systems:** understanding file systems, exploring Microsoft File Structures, Examining NTFS disks, Understanding whole disk encryption, windows registry, Microsoft startup tasks, MS-DOS startup tasks, virtual machines.

### **Text Books :**

1. *Computer Forensics, Computer Crime Investigation* by John R. Vacca, Firewall Media, New Delhi.
2. *Computer Forensics and Investigations* by Nelson, Phillips Einfinger, Steuart, CENGAGE Learning

### **Reference Books :**

1. *Real Digital Forensics* by Keith J. Jones, Richard Bejtlich, Curtis W. Rose, Addison- Wesley Pearson Education
2. *Forensic Compiling, A Tractitioneris Guide* by Tony Sammes and Brian Jenkinson, Springer International edition.
3. *Computer Evidence Collection & Presentation* by Christopher L.T. Brown, Firewall Media.
4. *Homeland Security, Techniques & Technologies* by Jesus Mena, Firewall Media.
5. *Software Forensics Collecting Evidence from the Scene of a Digital Crime* by Robert M.Slade, TMH 2005
6. *Windows Forensics* by Chad Steel, Wiley India Edition.

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### (13A05708) DIGITAL IMAGE PROCESSING (Elective-II)

#### **Course Objective:**

- Develop an overview of the field of image processing.
- Understand the Image segmentation, enhancement, compression etc., approaches and how to implement them.
- Prepare to read the current image processing research literature.
- Gain experience in applying image processing algorithms to real problems

#### **Learning Outcome:**

At the end of the course the students will be assessed to determine whether they are able to

- Analyze general terminology of digital image processing.
- Examine various types of images, intensity transformations and spatial filtering.
- Develop Fourier transform for image processing in frequency domain.
- Evaluate the methodologies for image segmentation, restoration, topology, etc.
- Implement image process and analysis algorithms.
- Apply image processing algorithms in practical applications

#### **UNIT I**

**Digital Image Fundamentals:** What is Digital Image Processing, examples of fields that use digital image processing, fundamental Steps in Digital Image Processing, Components of an Image processing system, Image Sampling and Quantization, Some Basic Relationships between Pixels, Linear and Nonlinear Operations, Probabilistic Methods

#### **UNIT II**

**Image Enhancement:** Image Enhancement in the spatial domain: some basic gray level transformations, histogram processing, enhancement using arithmetic and logic operations, basics of spatial filters, smoothing and sharpening spatial filters, combining spatial enhancement methods. Image enhancement in the frequency domain: introduction to Fourier transform and the frequency domain, smoothing and sharpening frequency domain filters, homomorphic filtering.

#### **UNIT III**

**Segmentation:** Thresholding, Edge Based Segmentation: Edge Image Thresholding, Region Based Segmentation, Matching, Shape Representation and Description: Region Identification, Contour Based Shape Representation and Description

#### **UNIT IV**

**Image Compression:** Fundamentals, image compression models, elements of information theory, error-free compression, lossy compression, Shape representation : region identification, contour-based shape representation and description, region based shape representation and description.

#### **UNIT V**

**Morphological Image Processing:** Preliminaries, dilation, erosion, open and closing, hit transformation, basic morphologic algorithms.

**Color Image Processing:** Color fundamentals, Color Models and basics of full-color image processing

**Text Books :**

1. *Digital Image Processing, Rafael C.Gonzalez and Richard E. Woods, Third Edition, Pearson Education, 2007*
2. *Digital Image Processing, S.Sridhar, Oxford University Press*

**Reference Books :**

1. *Fundamentals of Digital Image Processing, S. Annadurai, Pearson Edun, 2001.*
2. *Digital Image Processing and Analysis, B. Chanda and D. Dutta Majumdar, PHI, 2003.*
3. *Image Processing, Analysis and Machine Vision, Milan Sonka, Vaclav Hlavac and Roger Boyle, 2<sup>nd</sup> Edition, Thomson Learning, 2001.*
4. *Digital Image Processing, Vipula Singh, Elsevier*

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**(13A05709) COMPUTER NETWORKS AND NETWORK SECURITY LAB**

**PART-A (Computer Networks)**

1. submit a report on the computer network facility available in the college including the devices used, topology used, specification of all the equipment used
2. submit a report on the Internet facility available in the college including the specification of the devices used and logical configuration
3. Implement the algorithm for parity method for error control
4. Implement the algorithm on hamming method for error correction (both single and block errors)
5. Implement the algorithm for check sum computation
6. Implement the distance vector routing algorithm
7. Implement the link state routing algorithm
8. Study any simulator available in the market and submit a report containing executive summary of it and detail description of the features

**PART-B (Network Security)**

1. Working with Sniffers for monitoring network communication (Ethereal)
2. Understanding of cryptographic algorithms and implementation of the same in C or C++
3. Using openssl for web server - browser communication
4. Using GNU PGP
5. Performance evaluation of various cryptographic algorithms
6. Using IPTABLES on Linux and setting the filtering rules
7. Configuring S/MIME for e-mail communication
8. Understanding the buffer overflow and format string attacks
9. Using NMAP for ports monitoring
10. Implementation of proxy based security protocols in C or C++ with features like confidentiality, integrity and authentication

Mobile Application Development Lab

Week-1

Working with J2ME Features: Say, creating a *Hello World* program Experiment with the most basic features and mobile application interaction concepts (lists, text boxes, buttons, radio boxes, soft buttons, graphics, etc)

1.1 Create a program which creates to following kind of menu.

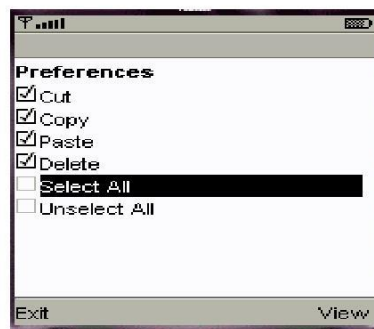
- \* cut
- \* copy
- \* paste
- \* delete
- \* select all
- \* unselect all



1.2 Event Handling.

Create a menu which has the following options:

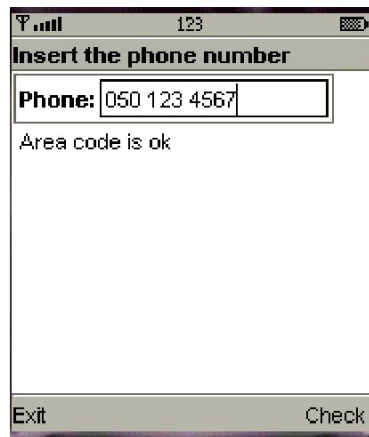
- \* cut - can be on/off
- \* copy - can be on/off
- \* paste - can be on/off
- \* delete - can be on/off
- \* select all - put all 4 options on \*
- unselect all - put all 4 options off



1.3. Input checking

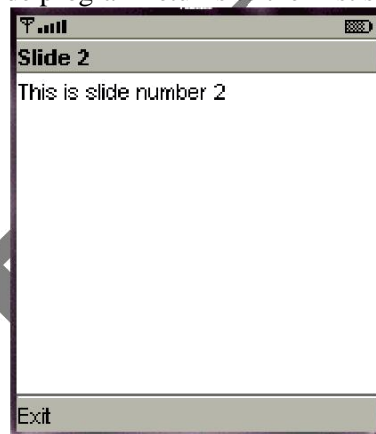
Create an MIDP application which examine, that a phone number, which a user has entered is in the given format.

- \* Area code should be one of the following: 040, 041, 050, 0400, 044
- \* There should 6-8 numbers in telephone number (+ area code)



**Week-II**

2.1. Create a slide show which has three slides, which includes only text. Program should change to the new slide after 5 seconds. After the third slide program returns to the first slide.

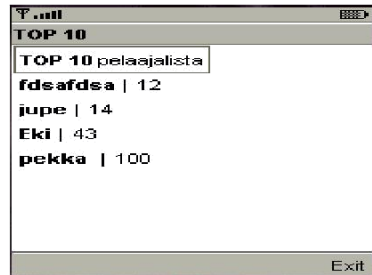


2.2 High-level UI

Create a MIDP application, which show to the user 5-10 quiz questions. All questions have 4 possible options and one right option exactly. Application counts and shows to the user how many right answers were right and shows them to user.



2.3 Create a MIDP application, where the user can enter player name and points. The program saves the information to the record using RMS at MIDP device. Program should also print out the top 10 player list to the end user. You can use this class in your game if you made own class for saving and reading record sets.

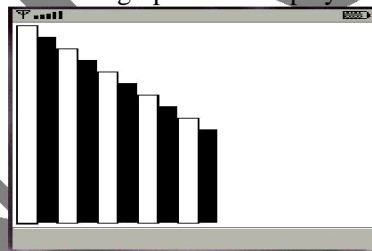


### Week-III

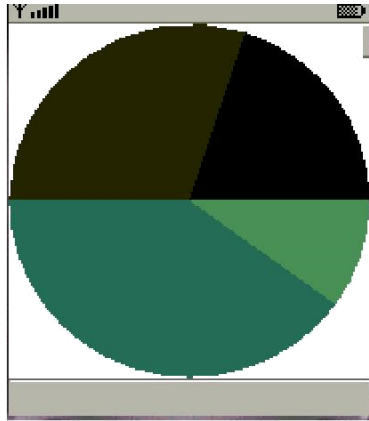
3.1 Create a slide show which has three slides, which includes pictures at PNG format. Program should change to the new slide other 5 seconds.



3.2 Create a MIDP application, which draws a bar graph to the display. Data values can be given at int[] array.



3.3 Create a MIDP application, which draws a bar graph to the display. Data values can be given at int[] array. You can enter four data (integer) values to the input text field.



#### **Week-IV**

Create, compile and run a basic UDP based client – server application.

#### **Week-V**

1. Develop an Android application to demonstrate Styles, Themes, Hiding the Activity Title and to Display a Dialog Window.
2. Add Progress Dialog window to the above project.
3. Add Displaying the Progress of an Operation to the above application

#### **Week-VI**

1. Develop an Android Application to demonstrate the Linking of an Activity by using Intents.
2. Develop an Android Application to demonstrate the Passing of Data to Object.

### **Computer Graphics Lab**

1. Implementation of line drawing, circle drawing and ellipse drawing algorithms.
2. Write a program to fill a polygon with different colors and patterns.
3. Write a program to generate a dotted dashed line.
4. Write a program to implement line clipping and polygon clipping algorithms.
5. Write a program to implement curve generation algorithms.
6. Write a program to perform 2-D and 3-D transformations.
7. Write a simple multimedia application consisting of text, sound, audio and video.
8. Write a program to generate a simple animation of bouncing ball.
9. Write a program which displays a digital clock.
10. Write a program to generate a cartoon character of a human. Add simple movements to the character.
11. Write a program that generates bar charts for the given data. The data is assumed to be present in the file. The values can be assumed to be in a specific range (say 1000 to 2000).
12. Write a program to simulate a pendulum.
13. Write a program to simulate a wall clock.
14. Write a program to simulate a fish.
15. Write a program to simulate road. Assume you are moving in a vehicle and you are seeing the road pass by

#### **Reference Books:**

1. Computer Graphics Principles and Practice in C, Second Edition, Foley, Dam, Feiner, John, Pearson.
2. Multimedia: Making It Work, Eighth Edition, Tay Vaughan, Tata Mc Graw-hill Edition.
3. Computer Graphics - C version, Donald D. Hearn, M.Pouline Baker, Pearson.
4. Computer Graphics with Virtual Reality System, Rajesh K.Mourya, Wiley India.
5. Principles of Computer Graphics, Theory and Practice, Shalini, Govil Pai, Springer.
6. Multimedia Applications, Relp Stteinmetz, Kolara Nahrstedt, Springer International Edition.
7. Principles of Multimedia, Ranjan Parckh, Second Edition, Mc Graw Hill



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### (13A52601) MANAGEMENT SCIENCE

#### **Course Objective:**

*The objective of this course is to equip the student the fundamental knowledge of Management Science and its application to effective management of human resources, materials and operations of an organization. It also aims to expose the students about the latest and contemporary developments in the field of management.*

#### **Learning outcome:**

*This course enables the student to know the principles and applications of management knowledge and exposure to the latest developments in the field. This helps to take effective and efficient managerial decisions on physical and human resources of an organization. Besides, the knowledge of Management Science facilitates for his/her personal and professional development.*

#### **UNIT 1**

##### **INTRODUCTION TO MANAGEMENT**

Definition of Management- Function of Management- Management as a Science and Art- Management as a Profession- Universality of Management- Henri Fayol's Administrative Theory – Elton Mayo's Human Relations Movement- Systems theory – Contingency theory- Monetary and non-monetary incentives to motivate work teams- Leadership –Definition- Qualities of successful leaders- Different leadership styles.

#### **UNIT II**

##### **ORGANIZATION DESIGN AND STRUCTURE**

Organization design and structure- Principles—Types of organization structure-Mechanic and Organic Structures- Line organization- Line & Staff organization- Functional Organization – Matrix organization structures- merits and demerits- Departmentation and Decentralization-Power and Authority- Delegation of authority-Principles for effective delegation of authority.

#### **UNIT III**

##### **HUMAN RESOURCE AND MATERIALS MANAGEMENT**

Concept of HRM-functions – Human Resource Planning-Job Analysis-Recruitment and Selection- Training and Development- Performance appraisal –methods- Wage and Salary Administration- Grievances handling Procedure-Material Management- Need for Inventory control- Economic order quantity- ABC analysis- Management of purchase, stores and stores records.-Marketing Management – Concept- Channels of distribution- Marketing mix and product mix.

#### **UNIT IV**

##### **MANAGEMENT OF OPERATIONS & PROJECT MANAGEMENT**

Nature of organizational control- Marketing control- HR control- effective control systems-Operations Management- Essentials of operations management- Trends in operational management-Designing operation system for effective management of an organization-Project Management – Network Analysis-PERT and CPM-Project crashing (Simple problems)

#### **UNIT V**

##### **CONTEMPORARY MANAGEMENT ISSUES**

Strategic Management-Concept- Mission-Vision-Core values-Setting objectives-Corporate planning – Environmental scanning-SWOT analysis- Steps in strategy formulation & implementation- Management Information System (MIS)- Enterprise Resource Planning (ERP)-Just-in-Time (JIT)-

Total Quality Management (TQM) – Supply Chain Management-Six Sigma-Business Process Outsourcing (BPO).

**Text Books:**

1. *Stoner, Freeman, Gilbert, Management, Pearson, Six Edition 2008*
2. *Aryasri: Management Science, Fourth Edition TMH, 2012.*

**Reference Books:**

1. *Vijay Kumar & Apparo, Introduction to Management Science, Cengage, 2011.*
2. *Kotler Philip & Keller Kevin Lane: Marketing Management, 14<sup>th</sup> Edition, Pearson, 2012.*
3. *Aswathappa, Human Resource Management, Himalaya, 2012.*
4. *Kanishka Bedi, Production and Operations Management, Oxford University Press, 2011.*
5. *Schermerhorn, Capling, Poole & Wiesner: Management, Wiley, 2012.*
6. *Joseph M Putti, Management Principles, Mc Millan Publishers, 2012.*

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### **(13A05801) CLOUD COMPUTING**

#### **Course Objective:**

- *To explain the evolving computer model called cloud computing.*
- *To introduce the various levels of services that can be achieved by cloud computing.*
- *To describe the security aspects in cloud computing.*

#### **Learning Outcome:**

- *Ability to create cloud computing environment*
- *Ability to design applications for Cloud environment*

#### **UNIT I**

##### **Systems Modeling, Clustering and Virtualization**

Distributed System Models and Enabling Technologies, Computer Clusters for Scalable Parallel Computing, Virtual Machines and Virtualization of Clusters and Data centers.

#### **UNIT II**

##### **Foundations**

Introduction to Cloud Computing, Migrating into a Cloud, Enriching the 'Integration as a Service' Paradigm for the Cloud Era, The Enterprise Cloud Computing Paradigm.

#### **UNIT III**

##### **Infrastructure as a Service (IAAS) & Platform and Software as a Service (PAAS / SAAS)**

Virtual machines provisioning and Migration services, On the Management of Virtual machines for Cloud Infrastructures, Enhancing Cloud Computing Environments using a cluster as a Service, Secure Distributed Data Storage in Cloud Computing.

Aneka, Comet Cloud, T-Systems', Workflow Engine for Clouds, Understanding Scientific Applications for Cloud Environments

#### **UNIT IV**

##### **Monitoring, Management and Applications**

An Architecture for Federated Cloud Computing, SLA Management in Cloud Computing, Performance Prediction for HPC on Clouds, Best Practices in Architecting Cloud Applications in the AWS cloud, Building Content Delivery networks using Clouds, Resource Cloud Mashups.

#### **UNIT V**

##### **Governance and Case Studies**

Organizational Readiness and Change management in the Cloud age, Data Security in the Cloud, Legal Issues in Cloud computing, Achieving Production Readiness for Cloud Services.

#### **Text Books :**

1. *Cloud Computing: Principles and Paradigms by Rajkumar Buyya, James Broberg and Andrzej M. Goscinski, 2011, Wiley.*
2. *Distributed and Cloud Computing, Kai Hwang, Geoffery C.Fox, Jack J.Dongarra, 2012, Elsevier.*

#### **Reference Books :**

1. *Cloud Computing: A Practical Approach, Anthony T.Velte, Toby J.Velte, Robert Elsenpeter, Tata McGraw Hill, rp2011.*
2. *Enterprise Cloud Computing, Gautam Shroff, Cambridge University Press, 2010.*

3. *Cloud Computing: Implementation, Management and Security*, John W. Rittinghouse, James F.Ransome, CRC Press, rp2012.
4. *Cloud Application Architectures: Building Applications and Infrastructure in the Cloud*, George Reese, O'Reilly, SPD, rp2011.
5. *Cloud Security and Privacy: An Enterprise Perspective on Risks and Compliance*, Tim Mather, Subra Kumaraswamy, Shahed Latif, O'Reilly, SPD, rp2011.

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**(13A05802) SOFTWARE PROJECT MANAGEMENT  
(Elective-III)**

**Course Objective:**

*The main goal of software development projects is to create a software system with a predetermined functionality and quality in a given time frame and with given costs. For achieving this goal, models are required for determining target values and for continuously controlling these values. This course focuses on principles, techniques, methods & tools for model-based management of software projects, assurance of product quality and process adherence (quality assurance), as well as experience-based creation & improvement of models (process management). The goals of the course can be characterized as follows:*

- *Understanding the specific roles within a software organization as related to project and process management*
- *Describe the principles, techniques, methods & tools for model-based management of software projects, assurance of product quality and process adherence (quality assurance), as well as experience-based creation & improvement of models (process management).*
- *Understanding the basic infrastructure competences (e.g., process modeling and measurement)*
- *Understanding the basic steps of project planning, project management, quality assurance, and process management and their relationships*

**Learning Outcome:**

- *Describe and determine the purpose and importance of project management from the perspectives of planning, tracking and completion of project.*
- *Compare and differentiate organization structures and project structures*
- *Implement a project to manage project schedule, expenses and resources with the application of suitable project management tools*

**UNIT I**

**Conventional Software Management:** The waterfall model, conventional software Management performance. Evolution of Software Economics: Software Economics, pragmatic software cost estimation

**UNIT II**

**Improving Software Economics:** Reducing Software product size, improving software processes, improving team effectiveness, improving automation, Achieving required quality, peer inspections.

**The old way and the new:** The principles of conventional software engineering, principles of modern software management, transitioning to an iterative process

**UNIT III**

**Life cycle phases:** Engineering and production stages, inception, Elaboration, construction, transition phases.

**Artifacts of the process:** The artifact sets, Management artifacts, Engineering artifacts, programmatic artifacts. Model based software architectures: A Management perspective and technical perspective.

**UNIT IV**

**Work Flows of the process:** Software process workflows, Inter trans workflows. Checkpoints of the Process: Major Mile Stones, Minor Milestones, Periodic status assessments. Iterative Process Planning: Work breakdown structures, planning guidelines, cost and schedule estimating, Interaction planning process, Pragmatic planning.

**Project Organizations and Responsibilities:** Line-of-Business Organizations, Project Organizations, evolution of Organizations.

**Process Automation :** Automation Building Blocks, The Project Environment

## UNIT V

**Project Control and Process instrumentation:** The server care Metrics, Management indicators, quality indicators, life cycle expectations pragmatic Software Metrics, Metrics automation. Tailoring the Process: Process discriminants, Example.

**Future Software Project Management:** Modern Project Profiles Next generation Software economics, modern Process transitions.

**Case Study :** The Command Center Processing and Display System-Replacement(CCPDS-R)

### **Text Books :**

1. *Software Project Management, Walker Royce, Pearson Education.*
2. *Software Project Management, Bob Hughes & Mike Cotterell, fourth edition, Tata Mc-Graw Hill*

### **Reference Books :**

1. *Applied Software Project Management, Andrew Stellman & Jennifer Greene, O'Reilly, 2006*
2. *Head First PMP, Jennifer Greene & Andrew Stellman, O'Reilly, 2007*
3. *Software Engineering Project Management, Richard H. Thayer & Edward Yourdon, second edition, Wiley India, 2004.*
4. *Agile Project Management, Jim Highsmith, Pearson education, 2004*
5. *The art of Project management, Scott Berkun, O'Reilly, 2005.*
6. *Software Project Management in Practice, Pankaj Jalote, Pearson Education, 2002*

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**(13A05803) SOFTWARE ARCHITECTURE & DESIGN PATTERNS  
(Elective-III)**

**Course Objective:**

- *To understand interrelationships, principles and guidelines governing architecture and evolution over time.*
- *To understand various architectural styles of software systems.*
- *To understand design patterns and their underlying object oriented concepts.*
- *To understand implementation of design patterns and providing solutions to real world software design problems.*
- *To understand patterns with each other and understanding the consequences of combining patterns on the overall quality of a system*

**Learning Outcome:**

- *Know concepts, principles, techniques, and methods for design, analysis, and maintenance of software architectures*
- *Know the underlying object oriented principles of design patterns.*
- *Understand the context in which the pattern can be applied*
- *Understand how the application of a pattern affects the system quality and its tradeoffs*

**UNIT I**

**Introduction:** What is Software Architecture? An Engineering Discipline for Software, The Status of Software Architecture.

**Architectural Styles:** Architectural Styles, Pipes and Filters, Data Abstraction and Object-Oriented Organization, Event-Based, Implicit Invocation, Layered Systems, Repositories, Interpreters, Process Control, Other Familiar Architectures, Heterogeneous Architectures.

**Shared Information Systems:** Shared Information Systems, Database Integration, Integration in Software Development Environments, Architectural Structures for Shared Information Systems.

**UNIT II**

**Introduction:** What Is a Design Pattern? Design Patterns in Smalltalk MVC, Describing Design Patterns, The Catalog of Design Patterns, Organizing the Catalog, How Design Patterns Solve Design Problems, How to Select a Design Pattern, How to Use a Design Pattern.

**Creational Patterns:** Abstract Factory, Builder, Factory Method, Prototype, Singleton, Discussion of Creational Patterns.

**UNIT III**

**Structural Pattern Part-I:** Adapter, Bridge, Composite.

**Structural Pattern Part-II:** Decorator, Facade, Flyweight, Proxy.

**UNIT IV**

**Behavioral Patterns Part-I:** Chain of Responsibility, Command, Interpreter, Iterator, Mediator, Memento, Observer.

**UNIT V**

**Behavioral Patterns Part-II:** State, Strategy, Template Method, Visitor, Discussion of Behavioral Patterns.

**A Case Study (Designing a Document Editor):** Design Problems, Document Structure, Formatting, Embellishing the User Interface, Supporting Multiple Look-and-Feel Standards, Supporting Multiple Window Systems, User Operations, Spelling Checking and Hyphenation.

**Text Books :**

1. *Design Patterns* By Erich Gamma, Pearson Education
2. *Software Architecture: Perspective on an Emerging Discipline* By Mary Shaw, David Garlan, PHI.

**Reference Books :**

1. *Software Architecture in Practice* by Len Bass, Paul Clements, Rick Kazman, Third Edition, Pearson Education.
2. *Head First Design Patterns* By Eric Freeman-Oreilly-spd.
3. *Design Patterns Explained* By Alan Shalloway, Pearson Education.
4. *Pattern Oriented Software Architecture*, F.Buschmann&others, John Wiley & Sons
5. *Pattern's in JAVA Vol-I* By Mark Grand, Wiley DreamTech.
6. *Pattern's in JAVA Vol-II* By Mark Grand, Wiley DreamTech.
7. *JAVA Enterprise Design Patterns Vol-III* By Mark Grand, Wiley DreamTech



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### (13A05804) STORAGE AREA NETWORKS (Elective-III)

#### **Course Objective:**

- *Understand Storage Area Networks characteristics and components.*
- *Become familiar with the SAN vendors and their products*
- *Learn Fiber Channel protocols and how SAN components use them to communicate with each other*
- *Become familiar with Cisco MDS 9000 Multilayer Directors and Fabric Switches Thoroughly learn Cisco SAN-OS features.*
- *Understand the use of all SAN-OS commands. Practice variations of SANOS features*

#### **Learning Outcome:**

- *Able to Categorize Storage Networking Issues*
- *Able to Identify the components and uses of a Storage Area Networks (SAN)*
- *Describe Network Attached Storage*

#### **UNIT I**

Review data creation and the amount of data being created and understand the value of data to a business, challenges in data storage and data management, Solutions available for data storage, Core elements of a data center infrastructure, role of each element in supporting business activities, Hardware and software components of the host environment, Key protocols and concepts used by each component ,Physical and logical components of a connectivity environment ,Major physical components of a disk drive and their function, logical constructs of a physical disk, access characteristics, and performance Implications

#### **UNIT II**

Concept of RAID and its components , Different RAID levels and their suitability for different application environments: RAID 0, RAID 1, RAID 3, RAID 4, RAID 5, RAID 0+1, RAID 1+0, RAID 6, Compare and contrast integrated and modular storage systems ,High-level architecture and working of an intelligent storage system. Evolution of networked storage, Architecture, components, and topologies of FC-SAN, NAS, and IP-SAN , Benefits of the different networked storage options, Understand the need for long-term archiving solutions and describe how CAS fulfills the need , Understand the appropriateness of the different networked storage options for different application environments

#### **UNIT III**

List reasons for planned/unplanned outages and the impact of downtime, Impact of downtime, Differentiate between business continuity (BC) and disaster recovery (DR) ,RTO and RPO, Identify single points of failure in a storage infrastructure and list solutions to mitigate these failures

#### **UNIT IV**

Architecture of backup/recovery and the different backup/recovery topologies , replication technologies and their role in ensuring information availability and business continuity, Remote replication technologies and their role in providing disaster recovery and business continuity capabilities

#### **UNIT V**

Identify key areas to monitor in a data center, Industry standards for data center monitoring and management, Key metrics to monitor for different components in a storage infrastructure, Key management tasks in a data center. Information security, Critical security attributes for information systems, Storage security domains, List and analyzes the common threats in each domain Virtualization technologies, block-level and file-level virtualization technologies and processes

**Case Studies:**

The technologies described in the course are reinforced with EMC examples of actual solutions. Realistic case studies enable the participant to design the most appropriate solution for given sets of criteria

**Text Books :**

1. *Information Storage and Management, EMC Corporation, Wiley.*

**Reference Books :**

1. *Storage Networks: The Complete Reference, Robert Spalding, Tata McGraw Hill, Osborne, 2003.*
2. *Building Storage Networks, Marc Farley, Tata McGraw Hill, Osborne, 2001.*
3. *Storage Area Network Fundamentals, Meeta Gupta, Pearson Education Limited, 2002*

## JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

B.Tech. IV-II Sem.

Th	Tu	C
3	1	3

### (13A05805) ARTIFICIAL INTELLIGENCE (Elective-III)

#### **Course Objective:**

- To learn the difference between optimal reasoning Vs human like reasoning
- To understand the notions of state space representation, exhaustive search, heuristic search along with the time and space complexities
- To learn different knowledge representation techniques
- To understand the applications of AI namely, Game Playing, Theorem Proving, Expert Systems, Machine Learning and Natural Language Processing

#### **Learning Outcome:**

- Possess the ability to formulate an efficient problem space for a problem expressed in English
- Possess the ability to select a search algorithm for a problem and characterize its time and space complexities.
- Possess the skill for representing knowledge using the appropriate technique
- Possess the ability to apply AI techniques to solve problems of Game Playing, Expert Systems, Machine Learning and Natural Language Processing

#### **UNIT I**

**Introduction:** History, Intelligent Systems, Foundations of AI, sub areas of AI, applications. Problem solving – State – Space search and control strategies: Introduction, general problem solving, characteristics of problem, exhaustive searches, Heuristic search techniques, iterative-deepening A\*, Constraint Satisfaction and Planning. Game Playing, Bounded Look-ahead strategy and use of Evaluation functions, Alpha-Beta Pruning

#### **UNIT II**

**Logic concepts and Logic programming:** - Introduction, Propositional Calculus, Propositional Logic, Natural Deduction System, Axiomatic System, Semantic Tableau System in propositional Logic, Resolution Refutation in Propositional Logic, Predicate Logic, Logic Programming. Knowledge Representation: Introduction, Approaches to Knowledge Representation, Knowledge Representation using Semantic Network, Extended Semantic Networks for KR, Knowledge Representation using Frames, advanced knowledge representation Techniques.

#### **UNIT III**

**Expert System and Applications:** Introduction, Phases in Building Expert systems, expert system architecture, expert systems Vs Traditional Systems, Truth Maintenance Systems, Application of Expert Systems, List of shells and tools. Uncertainty Measure – Probability Theory: - Introduction, Probability Theory, Bayesian Belief Networks, Certainty factor theory, Dempster-Shafer Theory

#### **UNIT IV**

**Machine-Learning Paradigms:** - Introduction, Machine Learning systems. Supervised and unsupervised learning. Inductive learning, learning decision Tree (Text Book 2), Deductive Learning. Clustering, Support Vector Machines. Artificial Neural Networks: - Introduction, artificial neural Networks, Single-Layer Feed-Forward Networks, Multi-Layer Feed-Forward Network, Radial-Basis Function Networks, Design Issues of Artificial Neural Networks, Recurrent Networks

#### **UNIT V**

**Fuzzy Logic :** - Fuzzy sets, Evolutionary Programming, Genetic Programming Concepts, swarm Intelligence Ant colony Paradigm, Natural Language Processing

**Text Books :**

1. *Artificial Intelligence*, Saroj Kaushik, Cengage Learning 2011
2. *Artificial intelligence, A Modern Approach*, Russell, Norvig, Pearson Education, Second Edition. 2004

**Reference Books :**

1. *Artificial intelligence*, Rich, Knight, Nair, Tata McGraw Hill, Third Edition 2009

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR**

**B.Tech. IV-II Sem.**

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**(13A05806) PARALLEL AND RANDOMIZED ALGORITHMS  
(Elective-IV)**

**Prerequisites:**

- *Design and Analysis of Algorithms*
- *Basic Probability Theory*

**Course Objective:**

*The objective of this course is to make the students*

- *Familiar with the efficient parallel algorithms related to many areas of computer science: expression computation, sorting, graph-theoretic problems, etc.*
- *Familiar with the basic issues of implementing parallel algorithms.*
- *Familiar with the fundamentals of discrete probability theory;*
- *able to know the basic randomized algorithms and to analyze selected randomized algorithms;*
- *Familiar with the theory of Markov chains and their algorithmic applications; knowledgeable about selected randomized data structures;*

**Learning Outcome:**

*Students who complete the course will have demonstrated the ability to do the following:*

- *Argue the correctness of algorithms using inductive proofs and invariants.*
- *Analyze worst-case running times of algorithms using asymptotic analysis.*
- *Explain the different ways to analyze parallel algorithms.*
- *Explain the different ways to analyze randomized algorithms.*
- *Analyze randomized algorithms. Employ indicator random variables and linearity of expectation to perform the analyses. Recite analyses of algorithms that employ this method of analysis.*
- *Compare between different randomized data structures. Pick an appropriate data structure for a design situation.*

**UNIT I**

Sequential model, need of alternative model, parallel computational models such as PRAM, LMCC, Hypercube, Cube Connected Cycle, Butterfly, Perfect Shuffle Computers, Tree model, Pyramid model, Fully Connected model, PRAM-CREW, EREW models, simulation of one model from another one

**UNIT II**

Performance Measures of Parallel Algorithms, speed-up and efficiency of PA, Cost- optimality, An example of illustrate Cost- optimal algorithms- such as summation, Min/Max on various models

**UNIT III**

Parallel Sorting Networks, Parallel Merging Algorithms on CREW/EREW/MCC, Parallel Sorting Networks on CREW/EREW/MCC/, linear array

Parallel Searching Algorithm, Kth element, Kth element in X+Y on PRAM, Parallel Matrix, Transportation and Multiplication Algorithm on PRAM, MCC, Vector-Matrix Multiplication, Solution of Linear Equation, Root finding.

**UNIT IV**

Randomized Algorithms: Example, Randomized Quicksort and Mincut Algorithms, Moments and Deviations - Markov and Chebyshev Inequalities; Chernoff Bounds, martingales, Markov Chains and Random walks

## **UNIT V**

Randomized Data Structures, Randomized Search Trees, Game tree; Hashing, Random Graphs, Random Walks in graphs, Derandomization

### **Text Books :**

1. *Designing Efficient Algorithms for Parallel Computer*, M.J. Quinn, McGrawHill.
2. *Probability and Computing: Randomized algorithms and Probabilistic Analysis*, Michael Mitzenmacher and Eli Upfal. Cambridge University Press, 2005

### **Reference Books :**

1. *The Design and Analysis of Parallel Algorithms*, S.G.Akl, PHI, 1989.
2. *Randomized Algorithms*, Rajeev Motwani and Prabhakar Raghavan, Cambridge University Press.
3. *Design and Analysis of Randomized Algorithms: Introduction to Design Paradigms*. Juraj Hromkovic, Springer, 2005.
4. *Introducti on to Parallel Algorithms and Architectures: Arrays, Trees, Hypercubes*, F.T.Lei ghton, MK Publishers, San Mateo California, 1992

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

B.Tech. IV-II Sem.

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3	1	3

(13A05807) EMBEDDED SYSTEMS  
(Elective-IV)

**Course Objective:**

- Study embedded computer system hardware
- Study Design, implement, and debug multi-threaded application software that operates under real-time constraints on embedded computer systems
- Use and describe the implementation of a real-time operating system on an embedded computer system
- Formulate an embedded computer system design problem including multiple constraints; create a design that satisfies the constraints.
- Create computer software and hardware implementations that operate according to well-known standards

**Learning Outcome:**

- Design embedded computer system hardware
- Design embedded computer software
- Design real-time operating systems

**UNIT I**

**Embedded Computing:** Introduction, Complex Systems and Microprocessor, The Embedded System Design Process, Formalisms for System Design, Design Examples

**The 8051 Architecture :** Introduction, 8051 Micro controller Hardware, Input/output Ports and Circuits, External Memory, Counter and Timers, Serial data Input/output, Interrupts

**UNIT II**

**Basic Assembly Language Programming Concepts:** The Assembly Language Programming Process, Programming Tools and Techniques, Programming the 8051, Data Transfer and Logical Instructions. Arithmetic Operations, Decimal Arithmetic, Jump and Call Instructions, Further Details on Interrupts.

**UNIT III**

**Applications:** Interfacing with Keyboards, Displays, D/A and A/D Conversions, Multiple Interrupts, Serial Data Communication.

**Introduction to Real – Time Operating Systems:** Tasks and Task States, Tasks and Data, Semaphores, and Shared Data; Message Queues, Mailboxes and Pipes, Timer Functions, Events, Memory Management, Interrupt Routines in an RTOS Environment.

**UNIT IV**

**Basic Design Using a Real-Time Operating System:** Principles, Semaphores and Queues, Hard Real-Time Scheduling Considerations, Saving Memory and Power, An example RTOS like  $\mu$ C-OS (Open Source); Embedded Software Development Tools: Host and Target machines, Linker/Locators for Embedded Software, Getting Embedded Software into the Target System; Debugging Techniques: Testing on Host Machine, Using Laboratory Tools, An Example System.

**UNIT V**

**Introduction to advanced architectures:** ARM and SHARC, Processor and memory organization and Instruction level parallelism; Networked embedded systems: Bus protocols, I2C bus and CAN bus; Internet-Enabled Systems, Design Example-Elevator Controller.

**Text Books :**

1. *Computers and Components, Wayne Wolf, Elsevier.*
2. *The 8051 Microcontroller, Kenneth J. Ayala, Thomson.*
3. *An Embedded Software Primer, David E. Simon, Pearson Education*

**Reference Books :**

1. *Embedding system building blocks, Labrosse, via CMP publishers.*
2. *Embedded Systems, Raj Kamal, TMH.*
3. *Micro Controllers, Ajay V Deshmukhi, TMH.*
4. *Embedded System Design, Frank Vahid, Tony Givargis, John Wiley.*
5. *Microcontrollers, Raj kamal, Pearson Education*
6. *Embedded Systems, Lyla B. Das, Pearson*



# JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

B.Tech, IV-II Sem.

Th	Tu	C
3	1	3

## (13A05808) GAME THEORY (Elective-IV)

### Course Objective:

- To give an overview of a broad range of models that is studied in game theory.
- To discuss the main concepts in the game theory.
- To explain the classes of games.
- To discuss the application of game theory.
- Apply game-theoretic analysis, both formally and intuitively, to negotiation and bargaining situations.

### Learning Outcome:

By the end of the course, and after many years, student should be able to:

- Grasp, or recognize, real situations where game theory can be enlightening,
- Abstract a real situation into game theoretic formalism,
- Manipulate the formalism via game theory to reveal insights, and explain your insights in terms of the real situation.

### UNIT I

**Introduction:** Strategic Game: What is game theory? The theory of rational Choice Interacting decision makers. Strategic games, Examples: The prisoner's dilemma, Nash equilibrium examples of Nash Equilibrium, Best-response functions Dominated actions, Equilibrium in a single population: Symmetric games and symmetric equilibria

### UNIT II

**Mixed Strategy Equilibrium:** Introduction Strategic games in which players may randomize , Mixed strategy Nash equilibrium, Dominated actions, Pure equilibria when randomization is allowed, illustration, Equilibrium in a single population, illustration, The formation of players' beliefs, extensions, Representing preferences by expected payoffs. Extensive Game: Extensive games with perfect information, Strategies and outcomes, Nash equilibrium, Sub game perfect equilibrium, Finding sub game perfect equilibria of finite horizon games

### UNIT III

**Extensive games:** Extensions, Coalitional games and the core: Extensions: Allowing for simultaneous moves, illustration: entry into a monopolized industry , Discussion: Sub game perfect equilibrium and backward induction, Coalition games , the core, Illustration: ownership and the distribution of wealth other solution concepts, Bayesian Games: Motivational examples, General definitions, Two examples concerning information , Illustration :auctions, Auctions with an arbitrary distribution of valuations. Extensive games with imperfect information, Strategies, Nash equilibrium, Beliefs and sequential equilibrium, Signaling games, Illustration: Strategic information transmission.

### UNIT IV

**Strictly Competitive Games, Rationalizability:** Strictly competitive games and maximization, Maximization and Nash equilibrium, Strictly competitive games, Maximization and Nash equilibrium in strictly competitive games, Rationalizability, Iterated elimination of strictly dominated actions, Iterated elimination of weakly dominated actions, Dominance solvability. Evolutionary Equilibrium, Iterated Games: Monomorphic pure strategy equilibrium, Mixed Strategies and polymorphic equilibrium, Asymmetric contests, Variations on themes: Sibling behavior, Nesting behavior of wasps, the evolution of sex ratio.

## UNIT V

**Repeated games:** The main idea, Performances, Repeated games, Finitely and infinitely repeated Prisoner's dilemma, Strategies in an infinitely repeated Prisoner's dilemma, some Nash equilibria of an infinitely repeated Prisoner's Dilemma. Repeated Games: General Results, Bargaining: Nash equilibria of general infinitely repeated games, Sub game perfect equilibria of general infinitely repeated games, Finitely repeated games, Imperfect observability. Bargaining as an extensive game. Trade in market as an illustration Nash's axiomatic model, Relation between strategic and axiomatic models.

### **Text Books :**

1. *An Introduction to Game Theory, Martin Osborne, Oxford University Press, Indian Edition, 2011*

### **Reference Books :**

1. *Game Theory – Analysis of Conflict, Roger B Myerson, Harvard University Press, 2010*
2. *Microeconomic Theory, Andreu Mas – Colell Michael D Whinston and Jerry R Green, Oxford University Press New York 2011*

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR**

**B.Tech. IV-II Sem.**

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<b>3</b>	<b>1</b>	<b>3</b>

**(13A05809) ADHOC AND SENSOR NETWORKS  
(Elective-IV)**

**Course Objective:**

- *To understand the concepts of sensor networks*
- *To understand the MAC and transport protocols for adhoc networks*
- *To understand the security of sensor networks*
- *To understand the applications of adhoc and sensor networks*

**Learning Outcome:**

*At the end of the course students will be assessed to determine whether they are able to*

- *understand the issues of MAC layer and routing protocols*
- *understand the different types of adhoc routing protocol*
- *learn about the QoS aware adhoc routing protocols*
- *understand architecture and protocols of wireless sensor networks*

**UNIT I**

**Introduction to Ad Hoc Wireless Networks**

Characteristics of MANETs, Applications of MANETs, Challenges.

**Routing in MANETs**

Topology-based versus Position-based approaches, Topology based routing protocols, Position based routing, Other Routing Protocols

**UNIT II**

**Data Transmission in MANETs**

The Broadcast Storm, Multicasting, Geocasting

**TCP over Ad Hoc Networks**

TCP Protocol overview, TCP and MANETs, Solutions for TCP over Ad Hoc

**UNIT III**

**Basics of Wireless Sensors and Applications**

The Mica Mote, Sensing and Communication Range, Design Issues, Energy consumption, Clustering of Sensors, Applications

**Data Retrieval in Sensor Networks**

Classification of WSNs, MAC layer, Routing layer, High-level application layer support, Adapting to the inherent dynamic nature of WSNs

**UNIT IV**

**Security** Security in Ad hoc Wireless Networks, Key Management, Secure Routing, Cooperation in MANETs, Intrusion Detection Systems.

**Sensor Network Platforms and Tools**

Sensor Network Hardware, Sensor Network Programming Challenges, Node-Level Software Platforms

**UNIT V**

**Operating System – TinyOS**

**Imperative Language:** nesC, Dataflow style language: TinyGALS, Node-Level Simulators, ns-2 and its sensor network extension, TOSSIM

**Text Books :**

1. *Ad Hoc and Sensor Networks – Theory and Applications*, Carlos Corderio Dharma P. Aggarwal, World Scientific Publications / Cambridge University Press, March 2006
2. *Wireless Sensor Networks: An Information Processing Approach*, Feng Zhao, Leonidas Guibas, Elsevier Science imprint, Morgan Kaufman Publishers, 2005, rp2009.

**Reference Books :**

1. *Adhoc Wireless Networks – Architectures and Protocols*, C.Siva Ram Murthy, B.S.Murthy, Pearson Education, 2004
2. *Wireless Sensor Networks – Principles and Practice*, Fei Hu, Xiaojun Cao, An Auerbach book, CRC Press, Taylor & Francis Group, 2010
3. *Wireless Ad hoc Mobile Wireless Networks – Principles, Protocols and Applications*, Subir Kumar Sarkar, et al., Auerbach Publications, Taylor & Francis Group, 2008.
4. *Ad hoc Networking*, Charles E.Perkins, Pearson Education, 2001.
5. *Wireless Ad hoc Networking*, Shih-Lin Wu, Yu-Chee Tseng, Auerbach Publications, Taylor & Francis Group, 2007
6. *Wireless Ad hoc and Sensor Networks – Protocols, Performance and Control*, Jagannathan Sarangapani, CRC Press, Taylor & Francis Group, 2007, rp 2010.
7. *Security in Ad hoc and Sensor Networks*, Raheem Beyah, et al., World Scientific Publications / Cambridge University Press, , 2010
8. *Ad hoc Wireless Networks – A communication-theoretic perspective*, Ozan K.Tonguz, Gialuigi Ferrari, Wiley India, 2006, rp2009.
9. *Wireless Sensor Networks – Signal processing and communications perspectives*, Ananthram Swami, et al., Wiley India, 2007, rp2009.

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR**  
*(Established by Govt. of A.P., Act. No. 30 of 2008)*  
**ANANTHAPURAMU – 515 002 (A.P.) INDIA.**

**Course Structure for B.Tech-R15 Regulations**

**COMPUTER SCIENCE AND ENGINEERING**

**I B.Tech. - I Semester**

S.No	Course code	Subject	L	T	P	Drg	C
1.	15A52101	Functional English	3	1	-	-	3
2.	15A54101	Mathematics – I	3	1	-	-	3
3.	15A05101	Computer Programming	3	1	-	-	3
4.	15A56101	Engineering Physics	3	1	-	-	3
5.	15A03101	Engineering Drawing	-	-	-	6	3
6.	15A52102	English Language Communication Skills Lab	-	-	4	-	2
7.	15A56102	Engineering Physics Lab	-	-	4	-	2
8.	15A05102	Computer Programming Lab	-	-	4	-	2
Total			12	4	12	6	21

**I-II Semester**

S.No	Course code	Subject	L	T	P	C
1.	15A52201	English for Professional Communication	3	1	-	3
2.	15A54201	Mathematics – II	3	1	-	3
3.	15A05201	Data Structures	3	1	-	3
4.	15A51101	Engineering Chemistry	3	1	-	3
5.	15A01101	Environmental Studies	3	1	-	3
6.	15A05202	Data Structures Lab	-	-	4	2
7.	15A51102	Engineering Chemistry Lab	-	-	4	2
8.	15A99201	Engineering & IT Workshop	-	-	4	2
Total			15	5	12	21

\* L - Lecture hours

\*T - Tutorial hours

\*P - Practical hours

\*Drg - Drawing

\*C - Credits

**II B. Tech – I Sem**

<b>S. No</b>	<b>Course Code</b>	<b>Subject</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
1	15A54301	Mathematics III	3	1	-	3
2	15A05301	Database Management Systems	3	1	-	3
3	15A05302	Discrete Mathematics	3	1	-	3
4	15A99301	Basic Electrical and Electronics Engineering	3	1	-	3
5	15A04306	Digital Logic Design	3	1	-	3
6	15A52301	Managerial Economics and Financial Analysis	3	1	-	3
7	15A05303	Database Management Systems Laboratory	-	-	4	2
8	15A99302	Basic Electrical and Electronics Laboratory	-	-	4	2
		<b>Total</b>	<b>18</b>	<b>06</b>	<b>08</b>	<b>22</b>

**II B. Tech – II Sem**

<b>S. No</b>	<b>Course Code</b>	<b>Subject</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
1	15A54401	Probability and Statistics	3	1	-	3
2	15A05401	Software Engineering	3	1	-	3
3	15A05402	Computer Organization	3	1	-	3
4	15A04407	Microprocessors & Interfacing	3	1	-	3
5	15A05403	Object Oriented Programming using Java	3	1	-	3
6	15A05404	Formal Languages and Automata Theory	3	1	-	3
7	15A04408	Microprocessors & Interfacing Laboratory	-	-	4	2
8	15A05405	Java Programming Laboratory	-	-	4	2
9	15A05406	Comprehensive Online Examination-I	-	-	-	1
		<b>Total</b>	<b>18</b>	<b>06</b>	<b>08</b>	<b>23</b>

## B.Tech III-I Semester (CSE)

S. No.	Course Code	Subject	L	T	P	C
1.	15A05501	Operating Systems	3	1	-	3
2.	15A05502	Computer Networks	3	1	-	3
3.	15A05503	Object Oriented Analysis and Design	3	1	-	3
4.	15A05504	Principles of Programming Languages	3	1	-	3
5.	15A05505	Software Testing	3	1	-	3
6.	15A05506 15A05507 15A05508	<b>MOOCS-I</b> a. Introduction to Big Data b. R Programming c. Introduction to Operations Management	3	1	-	3
7.	15A05509	Object Oriented Analysis and Design & Software Testing Laboratory	-	-	4	2
8.	15A05510	Operating Systems Laboratory	-	-	4	2
9.	15A99501	Social Values & Ethics (Audit Course)	2	-	2	-
<b>Total</b>			<b>20</b>	<b>06</b>	<b>10</b>	<b>22</b>

## B.Tech III-II Semester (CSE)

S. No.	Course Code	Subject	L	T	P	C
1.	15A05601	Compiler Design	3	1	-	3
2.	15A05602	Data Warehousing & Mining	3	1	-	3
3.	15A05603	Design Patterns	3	1	-	3
4.	15A05604	Design and Analysis of Algorithms	3	1	-	3
5.	15A05605	Web and Internet Technologies	3	1	-	3
6.	15A05606 15A05607 15A05608 15A01608	<b>CBCC-I</b> a. Artificial Intelligence b. Linux Environment System c. System Applications & Product (SAP) d. Intellectual Property Rights	3	1	-	3
7.	15A05609	Web and Internet Technologies Laboratory	-	-	4	2
8.	15A05610	Data Warehousing & Mining Laboratory	-	-	4	2
9.	15A52602	Advanced English Language Communication Skills(AELCS) Laboratory) (Audit Course)	-	-	2	-
10.	15A05611	Comprehensive Online Examination-II	-	-	-	1
<b>Total</b>			<b>18</b>	<b>06</b>	<b>10</b>	<b>23</b>

**B.Tech IV-I Semester (CSE)**

S. No.	Course Code	Subject	L	T	P	C
1.	15A52601	Management Science	3	1	-	3
2.	15A05701	Grid & Cloud Computing	3	1	-	3
3.	15A05702	Information Security	3	1	-	3
4.	15A05703	Mobile Application Development	3	1	-	3
5.	15A05704 15A05705 15A05706	<b>CBCC-II</b> a. Software Architecture b. Computer Graphics c. Machine Learning	3	1	-	3
6.	15A05707 15A05708 15A05709	<b>CBCC-III</b> a. Software Project Management b. Distributed Systems c. Real Time Systems	3	1	-	3
7.	15A05710	Grid & Cloud Computing Laboratory	-	-	4	2
8.	15A05711	Mobile Application Development Laboratory	-	-	4	2
<b>Total</b>			<b>18</b>	<b>06</b>	<b>08</b>	<b>22</b>

**B.Tech IV-II Semester (CSE)**

S. No.	Course Code	Subject	L	T	P	C
1.	15A05801 15A05802 15A05803	<b>MOOCS-II</b> a. Data Analytics b. Mobile Computing c. Innovations and IT Management	3	1	-	3
2.	15A05804 15A05805 15A05806	<b>MOOCS-III</b> a. Building Large Scale Software Systems b. Enabling Technologies for Data Science Analytics : IoT c. Cyber Security	3	1	-	3
3.	15A05807	Comprehensive Viva-Voce	-	-	4	2
4.	15A05808	Technical Seminar	-	-	4	2
5.	15A05809	Project Work	-	-	24	12
<b>Total</b>			<b>6</b>	<b>2</b>	<b>32</b>	<b>22</b>



**Minor Discipline in CSE**

<b>S. No.</b>	<b>Course Code</b>	<b>Subject</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
1	15A05201	Data Structures	3	1	-	3
2	15A05301	Database Management Systems	3	1	-	3
3	15A05401	Software Engineering	3	1	-	3
4	15A05501	Operating Systems	3	1	-	3
5	15M05101	Minor Discipline Project	-	-	-	8
<b>Total</b>			<b>12</b>	<b>4</b>	<b>-</b>	<b>20</b>

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR**

<b>B. Tech I-I Sem. (CSE)</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	<b>3</b>	<b>1</b>	<b>0</b>	<b>3</b>

**(15A52101) FUNCTIONAL ENGLISH****(Common to All Branches)****Preamble:**

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 book serves the purpose of preparing them for everyday communication and to face the global competitions in future.

The 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 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.

**Objectives:**

- To enable the students to communicate in English for academic and social purpose.
- To enable the students to acquire structure and written expressions required for their profession.
- To develop the listening skills of the students.
- To inculcate the habit of reading and critical thinking skills.
- To enhance the study skills of the students with emphasis on LSRW skills.

**UNIT –I**

**Topics:** Paragraph writing, writing letters, role play, reading graphs, prepositions, designing posters, tenses, making recommendations.

**Text:** ENVIRONMENTAL CONSCIOUSNESS' from *MINDSCAPES*  
Climate Change - Green Cover – Pollution

**UNIT –II**

**Topics:** Compound nouns, imperatives, writing instructions, interpreting charts and pictures, note making, role play, prefixes, subject-verb agreement.

**Text:** EMERGING TECHNOLOGIES from *MINDSCAPES*  
Solar Thermal Power - Cloud Computing - Nanotechnology

**UNIT –III**

**Topics:** Making conversations, homonyms and homophones, SMS and use of emotions, past participle for irregular verbs, group discussion, E - mail communication, antonyms, Preparing projects

**Text:** GLOBAL ISSUES from *MINDSCAPES*  
Child Labour - Food Crisis - Genetic Modification - E-Waste - Assistive Technology

**UNIT –IV**

**Topics:** Group discussion, affixes, double consonants, debates, writing a book / film review, predicting and problem-solving-future tense, adverbs

**Text:** SPACE TREK from *MINDSCAPES*  
Hubble Telescope - Chandrayan-2 - Anusat - Living Quarters - Space Tourism

**UNIT –V**

**Topics:** Compare and contrast, effective writing, group discussion, writing reports, writing advertisements, tweeting and blogging, types of interviews, framing questions.

**Text:** MEDIA MATTERS from *MINDSCAPES*

History of Media - Language and Media - Milestone in Media - Manipulation by Media - Entertainment Media - Interviews

**Text Books:**

1. MINDSCAPES: English for Technologists and Engineers, Orient Blackswan, 2014.

**References:**

1. A Practical Course in Effective English Speaking Skills by J.K.Gangal, PHI Publishers, New Delhi.2012
2. Technical Communication, Meenakshi Raman, Oxford University Press,2011.
3. Spoken English, R.K. Bansal & JB Harrison, Orient Longman,2013, 4<sup>th</sup> edition.
4. Murphy's English Grammar with CD, Murphy, Cambridge University Press,3<sup>rd</sup> edition.
5. An Interactive Grammar of Modern English, Shivendra K. Verma and Hemlatha Nagarajan , Frank Bros & CO,2008.

**Outcomes:**

- Have improved communication in listening, speaking, reading and writing skills in general.
- Have developed their oral communication and fluency in group discussions and interviews.
- Have improved awareness of English in science and technology context.
- Have achieved familiarity with a variety of technical reports.

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR**

B. Tech I-I Sem. (CSE)	L	T	P	C
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**(15A54101) MATHEMATICS – I****(Common to All Branches)****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  $x$ ,  $e^{ax}V(x)$ ,  $xV(x)$ .

**UNIT – II**

Method of variation of parameters, linear equations with variable coefficients: Euler-Cauchy Equations, Legendre's linear equation. Applications of linear differential equations- Mechanical and Electrical oscillatory circuits and Deflection of Beams.

**UNIT – III**

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.

**UNIT – IV**

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

**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. Engineering Mathematics-I, E. Rukmangadachari & E. Keshava Reddy, Pearson Publisher
2. Higher Engineering Mathematics, B.S.Grewal, Khanna publishers.

**References:**

1. Engineering Mathematics Volume-I, by T.K.V. Iyengar, B.Krishna Gandhi, S.Ranganatham and M.V.S.S.N.Prasad, S.Chand publication.
2. Advanced Engineering Mathematics, by Erwin Kreyszig, Wiley India.
3. Higher Engineering Mathematics, by B.V.Ramana, Mc Graw Hill publishers.
4. Advanced Engineering Mathematics, by Alan Jeffrey, Elsevier.

**Outcomes:**

- The students become familiar with the application of differential and integral calculus, ordinary differential equations and vector calculus to engineering problems.
- The students attain the abilities to use mathematical knowledge to analyze, formulate and solve problems in engineering applications.

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<b>B. Tech I-I Sem. (CSE)</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	<b>3</b>	<b>1</b>	<b>0</b>	<b>3</b>

**(15A05101) COMPUTER PROGRAMMING****(Common to All Branches)****Objectives:**

- Understand problem solving techniques
- Understand representation of a solution to a problem
- Understand the syntax and semantics of C programming language
- Understand the significance of Control structures
- Learn the features of C language

**UNIT - I**

Overview of Computers and Programming - Electronic Computers Then and Now - Computer Hardware - Computer Software - Algorithm - Flowcharts - Software Development Method - Applying the Software Development Method.

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.

**UNIT - II**

Selections Statements – Iteration Statements – Jump Statements- Expression Statements - Block Statements.

Single Dimensional Arrays – Generating a Pointer to an Array – Passing Single Dimension Arrays to Functions – Strings – Two Dimensional Arrays – Indexing Pointers – Array Initialization – Variable Length Arrays

**UNIT - III**

Pointer Variables – Pointer Operators - Pointer Expressions – Pointers And Arrays – Multiple Indirection – Initializing Pointers – Pointers to Functions – C's Dynamic Allocation Functions – Problems with Pointers.

Understanding the scope of Functions – Scope Rules – Type Qualifiers – Storage Class Specifiers- Functions Arguments –The Return Statement.

**UNIT - IV**

Command line arguments – Recursion – Function Prototypes – Declaring Variable Length Parameter Lists

Structures – Arrays of Structures – Passing Structures to Functions – Structure Pointers – Arrays and Structures within Structures – Unions – Bit Fields – Enumerations – typedef

**UNIT - V**

Reading and Writing Characters – Reading and Writing Strings – Formatted Console I/O – Printf - Scanf – Standard C Vs Unix File I/O – Streams and Files – File System Basics – Fread and Fwrite – Fseek and Random Access I/O – Fprintf ( ) and Fscanf( ) – The Standard Streams – The Preprocessor Directives #define and #include.

**Text Books:**

1. “The Complete Reference C”- Fourth Edition- Herbert Schildt- McGrawHill Education.
2. “The C Programming Language” Second Edition- Brian W. Kernighan- Dennis M. Ritchie- Prentice Hall-India. (UNIT- I)

**References:**

1. Programming in C, Second Edition – Pradip Dey, Manas Ghosh, Oxford University Press.
2. “C From Theory to Practice”- George S. Tselikis- Nikolaos D. Tselikas- CRC Press.
3. “Programming with C”- R S Bichkar- University Press.



4. Programming in C and Data Structures, J.R.Hanly, Ashok N. Kamthane and A.Ananda Rao, Pearson Education. (UNIT-I)
5. Computer Fundamentals and C Programming- Second Edition- P.Chenna Reddy- Available at Pothi.com (<http://pothi.com/pothi/book/dr-p-chenna-reddy-computer-fundamentals-and-c-programming>).

**Outcomes:**

- Apply problem solving techniques in designing the solutions for a wide-range of problems
- Choose appropriate control structure depending on the problem to be solved
- Modularize the problem and also solution

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	<b>3</b>	<b>1</b>	<b>0</b>	<b>3</b>

**(15A56101) ENGINEERING PHYSICS****(Common to CSE/EEE/CIVIL)****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.
- 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.
- 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.
- 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.
- 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 - I****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 – II**

### **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 – III**

### **QUANTUM MECHANICS AND ELECTRON THEORY**

*Quantum Mechanics:* Matter waves – de'Broglie hypothesis and properties - Schrodinger's time dependent and 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.

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**UNIT – IV****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 – V****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, 5<sup>th</sup> Edition, MacGraw Hill Publishers, NewDelhi, 2014.
2. Physics for Engineers - N.K Verma, 1<sup>st</sup> Edition, PHI Learning Private Limited, New Delhi,2014.

**References:**

1. Engineering Physics – Dr. M.N. Avadhanulu & Dr. P.G. Kshirsagar, 10<sup>th</sup> Edition, S.Chand and Company, New Delhi, 2014.
2. Engineering Physics – D K Pandey, S. Chaturvedi, 2<sup>nd</sup> Edition, Cengage Learning, New Delhi, 2013.
3. Engineering Physics – D.K Bhattacharya, Poonam Tandon, 1<sup>nd</sup> 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.

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**(15A03101) ENGINEERING DRAWING****(Common to CSE/EEE/CIVIL)****Objectives:**

- To gain and understanding of the basics of geometrical constructions of various planes and solids, understanding system of graphical representation of various objects and various views to draft and read the products to be designed and eventually for manufacturing applications.
- To learn about various projections, to understand complete dimensions and details of object.
- Ultimately student must get imaginary skill to put an idea of object, circuit, assembly of parts in black & white, to design a product and to understand the composition, which can be understood universally.

**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, Epicycloid and Hypocycloid

**UNIT II**

**Scales:** Plain, Diagonal and Vernier;

**Projection of Points:** Principles of orthographic projection – Convention – First angle projections, projections of points.

**UNIT III**

**Projections of Lines:** lines inclined to one or both planes, Problems on projections, Finding True lengths.

**Projections of Planes:** Projections of regular plane surfaces- plane surfaces inclined to both planes.

#### **UNIT IV**

**Projections of Solids:** Projections of Regular Solids with axis inclined to both planes.

**Developments of Solids:** Development of Surfaces of Right Regular Solids-Prism, Cylinder, Pyramid, Cone.

#### **UNIT V**

**Isometric and Orthographic Projections:** Principles of isometric projection- Isometric Scale- Isometric Views- Conventions- Isometric Views of lines, Planes, Simple solids (cube, cylinder and cone). Isometric projections of spherical parts. Conversion of isometric Views to Orthographic Views.

#### **Text Books:**

1. *Engineering Drawing*, N.D. Bhatt, Charotar Publishers
2. *Engineering Drawing*, K.L. Narayana & P. Kannaih, Scitech Publishers, Chennai

#### **References:**

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*, B.V.R. Gupta, J.K. Publishers

**Outcomes:**

- Drawing 2D and 3D diagrams of various objects.
- Learning conventions of Drawing, which is an Universal Language of Engineers.
- Drafting projections of points, planes and solids.



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<b>B. Tech I-I Sem. (CSE)</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	<b>0</b>	<b>0</b>	<b>4</b>	<b>2</b>

**(15A52102) ENGLISH LANGUAGE COMMUNICATION SKILLS (ELCS) LAB****(Common to All Branches)**

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

**UNIT - 1**

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

**UNIT - II**

5. Word Stress
6. Syllabification
7. Rules of word stress
8. Intonation

**UNIT - III**

9. Situational Dialogues
10. Role Plays
11. JAM
12. Describing people/objects/places

**UNIT - IV**

13. Debates
14. Group Discussions
15. Interview skills

**UNIT - V**

16. Video speech writing
17. Book reviews -oral and written

**Minimum Requirements 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.

**References:**

1. A Textbook of English Phonetics for Indian Students 2<sup>nd</sup> Ed T. Balasubramanian. (Macmillian),2012.
2. A Course in Phonetics and Spoken English, Dhamija Sethi, Prentice-Hall of India Pvt.Ltd
3. Speaking English Effectively, 2<sup>nd</sup> Edition Krishna Mohan & NP Singh, 2011. (Mcmillan).
4. A Hand book for English Laboratories, E.Suresh Kumar, P.Sreehari, Foundation Books,2011
5. Spring Board Succes, Sharada Kouhik, Bindu Bajwa, Orient Blackswan, Hyderabad, 2010.

**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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<b>B. Tech I-I Sem. (CSE)</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	<b>0</b>	<b>0</b>	<b>4</b>	<b>2</b>

**(15A56102) ENGINEERING PHYSICS LABORATORY****(Common to CSE/EEE/CIVIL)****Objectives:**

- 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 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 I year I semester**

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.

**References:**

1. Engineering Physics Practicals – NU Age Publishing House, Hyderabad.
2. Engineering Practical physics – Cengage Learning, Delhi.

**Outcomes:**

- Would recognize the important of optical phenomenon like Interference and diffraction.
- Would have acquired the practical application knowledge of optical fiber, semiconductor, dielectric 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.

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<b>B. Tech I-I Sem. (CSE)</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	<b>0</b>	<b>0</b>	<b>4</b>	<b>2</b>

**(15A05102) COMPUTER PROGRAMMING LAB****(Common to All branches)****Objectives:**

- Learn C Programming language
- To make the student solve problems, implement algorithms using C language.

**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  
$$e^x = 1 + x + \frac{x^2}{2!} + \frac{x^3}{3!} + \frac{x^4}{4!} + \dots$$
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 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 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
27. Write programs using recursion for finding Factorial of a number, GCD, LCM, and solving Towers of Hanoi problem.
28. Write a program to exchange two numbers using pointers.
29. 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.
30. A file consists of information about employee salary with fields employeedid, name, Basic, HRA, DA, IT, other-deductions, Gross and Net salary. Initially only employeedid, 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.
31. Write a program to perform Base (decimal, octal, hexadecimal, etc) conversion.

32. Write a program to find the square root of a number without using built-in library function.
33. Write a program to convert from string to number.
34. Write a program to implement pseudo random generator.
35. Write a program to generate multiplication tables from 11 to 20.
36. 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.
37. 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.
38. Write a program to find the execution time of a program.
39. 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:**

1. Instructors are advised to conduct the lab in LINUX/UNIX environment also
2. 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 Theory. Instructors are advised to change atleast 25% of the programs every year until the next syllabus revision.

**References:**

1. "How to Solve it by Computer", R.G. Dromey, Pearson.
2. "The C Programming Language", Brian W. Kernighan, Dennis M. Ritchie, Pearson.
3. "Let us C", Yeswant Kanetkar, BPB publications
4. "Pointers in C", Yeswant Kanetkar, BPB publications.
5. Programming in C and Data Structures, J.R.Hanly, Ashok N. Kamthane and A.Ananda Rao, Pearson Education.

**Outcomes:**

- Apply problem solving techniques to find solutions to problems
- Able to use C language features effectively and implement solutions using C language.
- Improve logical skills.



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<b>B. Tech I-II Sem. (CSE)</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	<b>3</b>	<b>1</b>	<b>0</b>	<b>3</b>

**(15A52201) ENGLISH FOR PROFESSIONAL COMMUNICATION****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 book serves the purpose of preparing them for everyday communication and to face the global competitions in future.

The 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 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**

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**Topics:** Group discussion, cause and effect, events and perspectives, debate, if conditional, essay writing.

**Text: LESSONS FROM THE PAST** from *MINDSCAPES*

Importance of History - Differing Perspectives - Modern Corporatism - Lessons From The Past

## **UNIT-II**

**Topics:** Idioms, essay writing, power point presentation, modals, listening and rewriting, preparing summary, debate, group discussion, role play, writing a book review, conversation

**Text: 'ENERGY'** from *MINDSCAPES*

Renewable and Non-Renewable Sources - Alternative Sources -Conservation -Nuclear Energy

## **UNIT-III**

**Topics:** Vocabulary, impromptu speech, creative writing, direct and indirect speech, fixed expressions, developing creative writing skills, accents, presentation skills, making posters, report writing

**Text: 'ENGINEERING ETHICS'** from *MINDSCAPES*

Challenger Disaster - Biotechnology - Genetic Engineering - Protection From Natural Calamities

## **UNIT-IV**

**Topics:** Vocabulary, Conversation, Collocation, Group discussion, Note-making, Clauses, Interpreting charts and tables , Report writing.

**Text: 'TRAVEL AND TOURISM' from *MINDSCAPES***

Advantages and Disadvantages of Travel - Tourism - Atithi Devo Bhava - Tourism in India

## **UNIT-V**

**Topics:** Vocabulary, phrasal verbs, writing a profile, connectives, discourse markers, problem-solving, telephone skills, application letters, curriculum vitae, interviews (telephone and personal)

**Text: 'GETTING JOB-READY' from *MINDSCAPES***

SWOT Analysis - Companies And Ways Of Powering Growth - Preparing For Interviews

### **Prescribed Text**

***MINDSCAPES***: English for Technologists and Engineers, Orient Blackswan, 2014.

### **REFERENCES:**

1. **Effective Tech Communication**, [Rizvi](#), Tata McGraw-Hill Education, 2007.
2. **Technical Communication**, Meenakshi Raman, Oxford University Press.
3. **English Conversations Practice**, Grant Taylor, Tata Mc GrawHill publications, 2013.
4. **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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<b>B. Tech I-II Sem. (CSE)</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	<b>3</b>	<b>1</b>	<b>0</b>	<b>3</b>

**(15A54201) MATHEMATICS – II****(Common to All Branches)**

**Objectives:** Our emphasis will be more on conceptual understanding and application of Fourier series, Fourier, Z and Laplace transforms and solution 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 transform – Application of Laplace transforms 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

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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. Engineering Mathematics, Volume - II, E. Rukmangadachari Pearson Publisher.

### **REFERENCES:**

1. Mathematical Methods by T.K.V. Iyengar, B.Krishna Gandhi, S.Ranganatham and M.V.S.S.N.Prasad S. Chand publication.
2. Higher Engineering Mathematics, by B.V.Ramana, Mc Graw Hill publishers.
3. Advanced Engineering Mathematics, by Erwin Kreyszig, Wiley India.

**Outcomes:**The student gains the knowledge to tackle the engineering problems using the concepts of Fourier series, various transforms and partial differential equations.

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	<b>3</b>	<b>1</b>	<b>0</b>	<b>3</b>

**(15A05201) DATA STRUCTURES****(Common to CSE and IT branches of Engineering)****Objectives:**

- Understand different Data Structures
- Understand Searching and Sorting techniques

**Unit-1**

**Introduction and overview:** Asymptotic Notations, One Dimensional array- Multi Dimensional array- pointer arrays.

**Linked lists:** Definition- Single linked list- Circular linked list- Double linked list- Circular Double linked list- Application of linked lists.

**Unit-2**

**Stacks:** Introduction-Definition-Representation of Stack-Operations on Stacks-Applications of Stacks.

**Queues:** Introduction, Definition- Representations of Queues- Various Queue Structures- Applications of Queues. **Tables:** Hash tables.

**Unit-3**

**Trees:** Basic Terminologies- Definition and Concepts- Representations of Binary Tree- Operation on a Binary Tree- Types of Binary Trees-Binary Search Tree, Heap Trees, Height Balanced Trees, B. Trees, Red Black Trees.

**Graphs:** Introduction- Graph terminologies- Representation of graphs- Operations on Graphs- Application of Graph Structures: Shortest path problem- topological sorting.

**Unit-4**

**Sorting** : Sorting Techniques- Sorting by Insertion: Straight Insertion sort- List insertion sort- Binary insertion sort- Sorting by selection: Straight selection sort- Heap Sort- Sorting by Exchange- Bubble Sort- Shell Sort-Quick Sort-External Sorts: Merging Order Files-Merging Unorder Files- Sorting Process.

**Unit-5**

**Searching:** List Searches- Sequential Search- Variations on Sequential Searches- Binary Search- Analyzing Search Algorithm- Hashed List Searches- Basic Concepts- Hashing Methods- Collision Resolutions- Open Addressing- Linked List Collision Resolution- Bucket Hashing.

**Text Books:**

1. "Classic Data Structures", Second Edition by Debasis Samanta, PHI.
2. "Data Structures A Pseudo code Approach with C", Second Edition by Richard F. Gilberg, Behrouz A. Forouzan, Cengage Learning.

**Reference Books:**

1. Fundamentals of Data Structures in C – Horowitz, Sahni, Anderson-Freed, Universities Press, Second Edition.
2. Schaum' Outlines – Data Structures – Seymour Lipschutz – McGrawHill- Revised First Edition.
3. Data structures and Algorithms using C++, Ananda Rao Akepogu and Radhika Raju Palagiri, Pearson Education.

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<b>B. Tech I-II Sem. (CSE)</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	<b>3</b>	<b>1</b>	<b>0</b>	<b>3</b>

**(15A51101) ENGINEERING CHEMISTRY****(Common to All Branches)****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 the concepts of chemistry and apply to various materials for engineering applications.

**UNIT – I WATER QUALITY AND 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 powder, ozonisation)

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.

Demineralsation of brackish water: Reverse Osmosis and Electrodialysis

## **UNIT – II POLYMERS**

i) Introduction: Basic concepts of polymerisation, Types of polymerisation (Chain Growth (Addition), Step growth (Condensation)), Mechanism: cationic, anionic, free radical and coordination covalent.

Plastomers: Thermosetting and Thermoplastics, Preparation, properties and Engineering applications of PVC, Teflon, Bakelite and nylons.

Elastomers

Natural Rubber; Processing of natural rubbers, Compounding of Rubber

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

ii) Conducting polymers: Mechanism, synthesis and applications of polyacetylene, polyaniline.

iii) Inorganic Polymers: Basic Introduction, Silicones, Polyphosphazins  $-(R)_2-P=N-$  applications

## **UNIT – III ELECTROCHEMISTRY**

i) Galvanic cells, Nernst Equation, Numerical calculations, Batteries: Rechargeable batteries (Lead acid, Ni-Cd, Lithium Ion Batteries), Fuels cells: (Hydrogen-Oxygen and Methanol-Oxygen, Solid oxide)

ii) Corrosion: Introduction, type of corrosion (Concentration cell corrosion, Galvanic corrosion), Chemical (Dry) and Electrochemical (Wet) Theory of corrosion. Galvanic series, factors affecting the corrosion (Metal and environment). Prevention: Cathodic protection (Sacrificial anode and impressed current), Inhibitors (Anodic and cathodic), electroplating (Copper, nickel and chromium) and electroless plating (Copper and nickel)

## **UNIT – IV FUELS AND COMBUSTION**

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

Solid Fuels: Coal-Classification and Analysis (proximate and ultimate), Coke :Characteristics of metallurgical coke, Manufacture of Metallurgical Coke by Otto Hoffmann's by product oven processes.

Liquid Fuels:

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

Power Alcohol: Manufacture, Advantages and Disadvantages of Power Alcohol

Gaseous Fuels: Natural gas, Producer gas, Water gas, Coal gas and Biogas. Determination calorific value of Gases fuels by Junker's calorimeter.

Combustion: Basic principles and numerical problems, Flue Gas analysis by Orsat's apparatus.

## **UNIT – V CHEMISTRY OF ENGINEERING MATERIALS**

i) Cement: Composition, Classification, preparation (Dry and Wet processes), Setting and Hardening (Hydration and Hydrolysis)

ii) Refractories: Introduction, Classification , properties and applications

iii) Lubricants: Introduction, classification (Solid, liquid, semi solid, emulsion and synthetic), Theory of lubrication (Thin film, Thick film & Extreme pressure) , properties of lubricants and applications.

iv) Carbon clusters: Fullerenes and Carbon Nano Tubes (CNT)

**Text Books:**

1. Engineering Chemistry, First Edition, Jayaveera KN, Subba Reddy GV and Ramachandraiah C, McGraw Hill Higher Education, New Delhi, 2013.
2. A Text Book of Engineering Chemistry, 15<sup>th</sup> Edition, Jain and Jain, Dhanapathi Rai Publications, New Delhi, 2013.

**References:**

1. A Text book of Engineering Chemistry, 12<sup>th</sup> Edition, SS Dhara, Uma, S. Chand Publications, New Delhi, 2010.
2. Engineering Chemistry, First edition, K.B. Chandra Sekhar, UN.Das and Sujatha Mishra, SCITECH Publications India Pvt Limited, 2010.
3. Engineering Chemistry, First edition, Seshamaheswaramma K and Mridula Chugh, Pearson Education, 2013.

**Outcomes:** The student is expected to:

- Differentiate between hard and soft water. Understand the disadvantages of using hard water domestically and industrially. Select and apply suitable treatments domestically and industrially.
- Understand the electrochemical sources of energy

Understand industrially based polymers, various engineering materials.

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3	1	0	3

**(15A01101) ENVIRONMENTAL STUDIES**

**OBJECTIVE:** *To make the students to get awareness on environment, to understand the importance of protecting natural resources, ecosystems for future generations and pollution causes due to the day to day activities of human life to save earth from the inventions by the engineers.*

**UNIT – I**

**MULTIDISCIPLINARY NATURE OF ENVIRONMENTAL STUDIES:** – Definition, Scope and Importance – Need for Public Awareness.

**NATURAL RESOURCES :** 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:** 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:

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

**BIODIVERSITY AND ITS CONSERVATION** : 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-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, 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

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**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. – 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 – V**

**HUMAN POPULATION AND THE ENVIRONMENT:** Population growth, variation among nations. Population explosion – Family Welfare Programmed. – 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.

**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, and birds – river, hill slopes, etc..

**TEXT BOOKS :**

1. Text book of Environmental Studies for Undergraduate Courses by Erach Bharucha for University Grants Commission, Universities Press.
2. Environmental Studies by Kaushik, New Age Publishers.

**REFERENCES :**

1. Environmental studies by R.Rajagopalan, Oxford University Press.
2. Comprehensive Environmental studies by J.P.Sharma, Laxmi publications.
3. Introduction to Environmental engineering and science by Gilbert M. Masters and Wendell P. Ela - Printice hall of India Private limited.

**Outcomes :**

- (1) Students will get the sufficient information that will clarify modern environmental concepts like equitable use of natural resources, more sustainable life styles etc.
- (2) Students will realize the need to change their approach so as to perceive our own environmental issues correctly, using practical approach based on observation and self learning.
- (3) Students become conversant with the fact that there is a need to create a concern for our environment that will trigger pro-environmental action; including simple activities we can do in our daily life to protect it.
- (4) By studying environmental sciences, students is exposed to the environment that enables one to find out solution of various environmental problems encountered on and often.

At the end of the course, it is expected that students will be able to identify and analyze environmental problems as well as the risks associated with these problems and efforts to be taken to protect the environment from getting polluted. This will enable every human being to live in a more sustainable manner.

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<b>B. Tech I-II Sem. (CSE)</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	<b>0</b>	<b>0</b>	<b>4</b>	<b>2</b>

**(15A05202) DATA STRUCTURES LAB****(Common to CSE & IT Branches of Engineering)****Course Objectives:**

- 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 identify the appropriate data structure for a given problem or application.
- Improve logical skills

**List of Experiments/Tasks**

40. Write a program to sort the elements of an array using sorting by exchange.
41. Write a program to sort the elements of an array using Selection Sort.
42. Write a program to implement heap sort.
43. Write a program to perform Linear Search on the elements of a given array.
44. Write a program to perform Binary Search on the elements of a given array.
45. Write a program to convert infix expression to postfix expression and evaluate postfix expression.
46. Write a program to implement stack, queue, circular queue using arrays and linked lists.



47. Write a program to perform the operations creation, insertion, deletion, and traversing a singly linked list.
  48. Write a program to perform the operations creation, insertion, deletion, and traversing a Doubly linked list.
10. Write a program to remove duplicates from ordered and unordered arrays.
11. Write a program to sort numbers using insertion sort.
  12. Write a program to implement quick sort using non-recursive and recursive approaches. Use randomized element as partitioning element.
  13. Write a program to search a word in a given file and display all its positions.
  14. Write a program for tic-tac-toe game.
  15. Write a program to perform operations creation, insertion, deletion and traversing on a binary search tree.
  16. Write a program to implement depth first search and breadth first search on graphs.
  17. Write a program to perform different operations on Red Black trees.
  18. Write a program to implement external sorting.
  19. Write a program to perform different operations of B Tree.

**Note:**

3. Instructors are advised to conduct the lab in LINUX/UNIX environment
4. 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 Theory. Instructors are advised to change atleast 25% of the programs every year until the next syllabus revision.

**References:**

6. Fundamentals of Data Structures in C", Horowitz, Sahni, Anderson-freed, Second Edition, Universities Press.
7. Data structures and Algorithms using C++, Ananda Rao Akepogu and Radhika Raju Palagiri, Pearson Education.

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<b>B. Tech I-II Sem. (CSE)</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	<b>0</b>	<b>0</b>	<b>4</b>	<b>2</b>

**(15A51102) ENGINEERING CHEMISTRY LAB  
(Common to All Branches)****Objectives:**

- Will learn practical understanding of the redox reaction
- 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. Estimation of iron (II) using diphenylamine indicator (Dichrometry – Internal indicator method).
5. Determination of Alkalinity of Water
6. Determination of acidity of Water
7. Preparation of Phenol-Formaldehyde (Bakelite)
8. Determination of Viscosity of oils using Redwood Viscometer I
9. Determination of Viscosity of oils using Redwood Viscometer II
10. Determination of calorific value of gaseous fuels by Junker's Calorimeter

11. Conductometric estimation of strong acid using standard sodium hydroxide solution
12. Determination of Corrosion rate and inhibition efficiency of an inhibitor for mild steel in hydrochloric acid medium.
13. Potentio metric determination of iron using standard potassium dichromate
14. Colorometric estimation of manganese.
15. pH meter calibration and measurement of pH of water and various other samples.

(Any 10 experiments from the above list)

**References:**

1. Vogel's Text book of Quantitative Chemical Analysis, Sixth Edition – Mendham J et al, Pearson Education, 2012.
2. Chemistry Practical– Lab Manual, First edition, Chandra Sekhar KB, Subba Reddy GV and Jayaveera KN, SM Enterprises, Hyderabad, 2014.

**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.

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	<b>0</b>	<b>0</b>	<b>4</b>	<b>2</b>

**(15A99201) ENGINEERING & I.T. WORKSHOP****ENGINEERING WORKSHOP****Course Objective:**

*The budding Engineer may turn out to be a technologist, scientist, entrepreneur, practitioner, consultant etc. There is a need to equip the engineer with the knowledge of common and newer engineering materials as well as shop practices to fabricate, manufacture or work with materials. Essentially he should know the labour involved, machinery or equipment necessary, time required to fabricate and also should be able to estimate the cost of the product or job work. Hence engineering work shop practice is included to introduce some common shop practices and on hand experience to appreciate the use of skill, tools, equipment and general practices to all the engineering students.*

**1. TRADES FOR EXERCISES:**

- a. Carpentry shop– Two joints (exercises) involving tenon and mortising, groove and tongue: Making middle lap T joint, cross lap joint, mortise and tenon T joint, Bridle T joint from out of 300 x 40 x 25 mm soft wood stock
- b. Fitting shop– Two joints (exercises) from: square joint, V joint, half round joint or dove tail joint out of 100 x 50 x 5 mm M.S. stock
- c. Sheet metal shop– Two jobs (exercises) from: Tray, cylinder, hopper or funnel from out of 22 or 20 guage G.I. sheet
- d. House-wiring– Two jobs (exercises) from: wiring for ceiling rose and two lamps (bulbs) with independent switch controls with or without looping, wiring for stair case lamp, wiring for a water pump with single phase starter.
- e. Foundry– Preparation of two moulds (exercises): for a single pattern and a double pattern.
- f. Welding – Preparation of two welds (exercises): single V butt joint, lap joint, double V butt joint or T fillet joint.

## **2. TRADES FOR DEMONSTRATION:**

- a. Plumbing
- b. Machine Shop
- c. Metal Cutting

Apart from the above the shop rooms should display charts, layouts, figures, circuits, hand tools, hand machines, models of jobs, materials with names such as different woods, wood faults, Plastics, steels, meters, gauges, equipment, CD or DVD displays, First aid, shop safety etc. (though they may not be used for the exercises but they give valuable information to the student). In the class work or in the examination knowledge of all shop practices may be stressed upon rather than skill acquired in making the job.

### **References:**

1. *Engineering Work shop practice for JNTU, V. Ramesh Babu, VRB Publishers Pvt. Ltd., 2009*
2. *Work shop Manual / P.Kannaiah/ K.L.Narayana/ SciTech Publishers.*
3. *Engineering Practices Lab Manual, Jeyapoovan, SaravanaPandian, 4/e Vikas*
4. *Dictionary of Mechanical Engineering, GHF Nayler, Jaico Publishing House.*

## **I.T. WORKSHOP**

### **Course Objective:**

- 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.

### **Learning Outcome:**

- 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. Crimping 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, and 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 color, 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, colors, 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. MOS study guide for word, Excel, Powerpoint & Outlook Exams”, Joan Lambert, Joyce Cox, PHI.
3. Introduction to Information Technology, ITL Education Solutions limited, Pearson Education.
4. Networking your computers and devices, Rusen, PHI
5. Trouble shooting, Maintaining & Repairing PCs”, Bigelows, TMH

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	<b>3</b>	<b>1</b>	<b>0</b>	<b>3</b>

**(15A54301) MATHEMATICS-III****(Common to All Branches)****Objectives:**

- This course aims at providing the student with the concepts 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 – Diagonalization 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 – Exponential curve-Power curve by method of least squares. Numerical Differentiation for Newton's interpolation formula. Numerical Integration: Trapezoidal rule – Simpson's 1/3 Rule – Simpson's 3/8 Rule.

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**UNIT – V**

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

**TEXT BOOKS:**

3. Higher Engineering Mathematics, B.S.Grewal, Khanna publishers.
4. Introductory Methods of Numerical Analysis, S.S. Sastry, PHI publisher.

**REFERENCES:**

2. Engineering Mathematics, Volume - II, E. Rukmangadachari Pearson Publisher.
3. 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:** The student will be able to analyze engineering problems using the concepts of Matrices and Numerical methods.

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	<b>3</b>	<b>1</b>	<b>0</b>	<b>3</b>

**(15A05301) DATABASE MANAGEMENT SYSTEMS****Objectives:**

- To understand the basic concepts and the applications of database systems.
- To master the basics of SQL and construct queries using SQL.
- To understand the relational database design principles.
- To become familiar with the basic issues of transaction processing and concurrency control.
- To become familiar with database storage structures and access techniques.

**UNIT-I**

Introduction-Database System Applications, Purpose of Database Systems, View of Data - Data Abstraction, Instances and Schemas, Data Models, Database Languages - DDL, DML, Database Architecture, Database Users and Administrators, History of Database Systems.

Introduction to Database design, ER diagrams, Beyond ER Design, Entities, Attributes and Entity sets, Relationships and Relationship sets, Additional features of ER Model, Conceptual Design with the ER Model, Conceptual Design for Large enterprises. Relational Model: Introduction to the Relational Model - Integrity Constraints over Relations, Enforcing Integrity constraints, Querying relational data, Logical database Design, Introduction to Views Destroying/ altering Tables and Views.

**UNIT-II**

Relational Algebra and Calculus: Relational Algebra - Selection and Projection, Set operations, Renaming, Joins, Division, Examples of Algebra Queries, Relational calculus - Tuple relational Calculus - Domain relational calculus - Expressive Power of Algebra and calculus.

Form of Basic SQL Query - Examples of Basic SQL Queries, Introduction to Nested Queries, Correlated Nested Queries, Set - Comparison Operators, Aggregate Operators, NULL values - Comparison using Null values - Logical connectives - AND, OR and NOT - Impact on SQL Constructs, Outer Joins, Disallowing NULL values, Complex Integrity Constraints in SQL Triggers and Active Databases.

**UNIT-III**

Introduction to Schema Refinement - Problems Caused by redundancy, Decompositions - Problem related to decomposition, Functional Dependencies - Reasoning about FDS, Normal Forms - FIRST, SECOND, THIRD Normal forms - BCNF - Properties of Decompositions - Loss less join Decomposition, Dependency preserving Decomposition, Schema Refinement in Data base Design - Multi valued Dependencies - FOURTH Normal Form, Join Dependencies, FIFTH Normal form, Inclusion Dependencies.

#### **UNIT-IV**

Transaction Management - Transaction Concept - Transaction State - Implementation of Atomicity and Durability - Concurrent - Executions - Serializability - Recoverability - Implementation of Isolation - Testing for serializability.

Concurrency Control - Lock - Based Protocols - Timestamp Based Protocols - Validation - Based Protocols - Multiple Granularity.

Recovery System-Failure Classification-Storage Structure-Recovery and Atomicity - Log - Based Recovery - Recovery with Concurrent Transactions - Buffer Management - Failure with loss of nonvolatile storage - Advance Recovery systems - Remote Backup systems.

#### **UNIT-V**

Overview of Storage and Indexing: Data on External Storage, File Organization and Indexing - Clustered Indexes, Primary and Secondary Indexes, Index data Structures - Hash Based Indexing, Tree based Indexing, Comparison of File Organizations.

Tree Structured Indexing: Intuitions for tree indexes, Indexed Sequential Access Methods(ISAM) B+ Trees: A Dynamic Index Structure, Search, Insert, Delete.

Hash Based Indexing: Static Hashing, Extendable hashing, Linear Hashing, Extendible vs. Linear Hashing.

#### **TEXT BOOKS:**

1. Data base Management Systems, Raghurama Krishnan, Johannes Gehrke, McGrawHill Education, 3rd Edition, 2003.
2. Data base System Concepts, A.Silberschatz, H.F. Korth, S.Sudarshan, McGraw Hill, VI edition, 2006.

**REFERENCES:**

1. Database Systems, 6th edition, Ramez Elmasri, Shamkat B. Navathe, Pearson Education, 2013.
2. Database Systems Concepts, Peter Rob & Carlos Coronel, Cengage Learning, 2008.
3. Introduction to Database Systems, C.J. Date, Pearson Education.
4. Database Management Systems, G.K. Gupta, McGrawHill Education.

**Outcomes:**

- Demonstrate the basic elements of a relational database management system,
- Ability to identify the data models for relevant problems.
- Ability to design entity relationship and convert entity relationship diagrams into RDBMS and formulate SQL queries on the respect data.
- Apply normalization for the development of application software.

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**(15A05302) DISCRETE MATHEMATICS****Course Objectives**

- Understand the methods of discrete mathematics such as proofs, counting principles, number theory, logic and set theory.
- Understand the concepts of graph theory, binomial theorem, and generating function in analysis of various computer science applications.

**Course Outcomes**

- Able to apply mathematical concepts and logical reasoning to solve problems in different fields of Computer science and information technology.
- Able to apply the concepts in courses like Computer Organization, DBMS, Analysis of Algorithms, Theoretical Computer Science, Cryptography, Artificial Intelligence

**UNIT I:****Mathematical Logic:**

Introduction, Connectives, Normal Forms, The theory of Inference for the Statement Calculus,  
The Predicate Calculus, Inference Theory of Predicate Calculus.

**UNIT II:****SET Theory:**

Basic concepts of Set Theory, Representation of Discrete structures, Relations and Ordering, Functions, Recursion.

**UNIT III:****Algebraic Structures:**

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Algebraic Systems: Examples and General Properties, Semi groups and Monoids, Polish expressions and their compilation, Groups: Definitions and Examples, Subgroups and Homomorphism's, Group Codes.

**Lattices and Boolean algebra:**

Lattices and Partially Ordered sets, Boolean algebra.

**UNIT IV:****An Introduction to Graph Theory:**

Definitions and Examples, Sub graphs, complements, Graph Isomorphism, Vertex Degree: Euler Trails and Circuits, Planar Graphs, Hamilton Paths and Cycles, Graph Coloring and Chromatic Polynomials

**Trees:**

Definitions, Properties, Examples, Rooted Trees, Trees and Sorting, Weighted trees and Prefix Codes, Biconnected Components and Articulation Points

**UNIT V:****Fundamental Principles of Counting:**

The rules of Sum and Product, Permutations, Combinations: The Binomial Theorem, Combinations with Repetition

**The Principle of Inclusion and Exclusion:**

The Principle of Inclusion and Exclusion, Generalizations of Principle, Derangements: Nothing is in Its Right Place, Rook Polynomials, Arrangements with Forbidden Positions

**Generating Functions:**

Introductory Examples, Definitions and Examples: Calculation Techniques, Partitions of Integers, The Exponential Generating Functions, The Summation Operator.

**TEXT BOOKS:**

1. "Discrete Mathematical Structures with Applications to Computer Science", J.P. Tremblay and R. Manohar, Mc Graw Hill Education, 2015.
2. "Discrete and Combinatorial Mathematics, an Applied Introduction", Ralph P. Grimaldi and B.V.Ramana, Pearson, 5<sup>th</sup> Edition, 2016.

**REFERENCE BOOKS:**

1. Graph Theory with Applications to Engineering by NARSINGH DEO, PHI.



2. Discrete Mathematics by R.K.Bisht and H.S. Dhimi, Oxford Higher Education.
3. Discrete Mathematics theory and Applications by D.S.Malik and M.K.Sen, Cengage Learning.
4. Elements of Discrete Mathematics, A computer Oriented approach by C L Liu and D P Mohapatra, MC GRAW HILL Education.
5. Discrete Mathematics for Computer scientists and Mathematicians by JOE L.Mott, Abraham Kandel and Theodore P.Baker, Pearson ,2<sup>nd</sup> Edition

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**(15A99301) BASIC ELECTRICAL AND ELECTRONICS ENGINEERING  
PART – A  
BASIC ELECTRICAL ENGINEERING**

**Objective:**

Basic Electrical Engineering contains basic Circuits, Network theorems, two port networks, DC generators & motors, Transformers, Induction motors. The objective is to study their performance aspects.

**UNIT – I Introduction to DC & AC Circuits**

Ohm's Law, R, L, C Components, Kirchhoff's Laws, Types of Sources, Simple problems on Resistive Networks, Series Parallel Circuits, Star Delta and Delta Star Transformation. Sinusoidal waveforms and Basic Definitions, Root Mean Square and average values of sinusoidal Currents and Voltages. Form Factor and Peak Factor.

**Network Theorems:** Thevenin's, Norton's, Maximum Power Transfer and Superposition Theorems for DC Excitations.

**Two Port Networks:** Two Port Network Parameters – Impedance, Admittance, Transmission and Hybrid Parameters and Their Relations.

**UNIT-II DC Machines**

**D.C Generators:** Constructional details of D.C. machines, Principle of Operation of D.C. generators, Types of D.C Generators, E.M.F Equation, O.C.C. of a D.C. Shunt Generator

**D.C Motors:** Principle of Operation of DC Motors, Torque Equation, Losses and Efficiency Calculation, Speed Control of D.C. shunt motor (Armature voltage control and Field flux control). Swinburne's Test and Applications.

**UNIT-III AC Machines**

**1-phase Transformers:** Principle of Operation, Constructional Details, E.M.F. equation, Losses and Efficiency, OC & SC Tests, Regulation of Transformers.

**3-Phase Induction Motors:** Principle of Operation, Slip, Torque (Simple Problems), Slip-Torque characteristics.

**3-phase Alternators:** Principle of Operation-Constructional Details-EMF Equation.

Outcome:

After going through this course the student acquires knowledge on basics of Electrical Circuits, Network theorems, two port networks, DC generators & motors, Transformers, Induction motors and Alternators.

**TEXT BOOKS:**

1. Basic Electrical Engineering, V. N. Mittle and Arvind Mittle, Mc Graw Hill (India) Pvt. Ltd., 2<sup>nd</sup> Edition, 2005.
2. Basic Electrical Engineering, T.K.Nagsarkar and M.S. Sukhija, Oxford University Press, 2<sup>nd</sup> Edition, 2011.

**REFERENCES:**

1. Basic Electrical Engineering, M.S.Naidu and S. Kamakshiah, Tata Mc Graw Hill, 3<sup>rd</sup> Edition, 2009.
2. Electrical and Electronic Technology, Hughes, Pearson Education.

**PART-B****UNIT I**

**Semiconductor Devices:** Intrinsic semiconductors-Electron-Hole Pair Generation, Conduction in Intrinsic Semiconductors, Extrinsic Semiconductors-N-Type and P-Type Semiconductors, Comparison of N-Type and P-Type Semiconductors. The p-n Junction – Drift and Diffusion Currents, The p-n Junction Diode-Forward Bias, Reverse Bias, Volt-Ampere Characteristics- Diode Specifications, Applications of Diode, Diode as a Switch. Diode as a Rectifier-Half-wave Rectifier, Full-Wave Rectifier, Full-Wave Bridge Rectifier, Rectifiers with Filters, Zener Diode- Volt-Ampere Characteristics, Zener Diode as Voltage Regulator.

**UNIT II**

**BJT and FETs:** Bipolar Junction Transistor (BJT) – Types of Transistors, Operation of NPN and PNP Transistors, Input-Output Characteristics of BJT-CB, CE and CC Configurations, Relation between  $I_c$ ,  $I_B$  and  $I_E$ . Transistor Biasing- Fixed Bias, Voltage Divider Bias, Transistor Applications- Transistor as an Amplifier, Transistor as a Switch, Junction Field Effect Transistor (JFET)- Theory and Operation of JFET, Output Characteristics, Transfer Characteristics, Configurations of JFET-CD, CS and CG Configurations, JFET Applications- JFET as an Amplifier, JFET as a Switch, Comparison of BJT and JFET, MOSFET-The Enhancement and Depletion MOSFET, Static Characteristics of MOSFET, Applications of MOSFET.

**UNIT III**

**Oscillators and Op-Amps:** Sinusoidal Oscillators, Barkhausen Criteria for Oscillator Operation, Components of an Oscillator-Transistor Amplifier Circuits, Feedback Circuits and Oscillator Circuits, Classification of Oscillators, LC Tuned, RC Phase Shift Oscillator circuits.

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**Operational Amplifiers(Op-Amps)**-Symbol of an Op-Amp, single Input and Dual Input Op-Amps(Differential Amplifier), Characteristics of an Ideal Op-Amp, Basic Forms of Op-Amps-Inverting & Non-Inverting Amplifiers, Applications of Op-Amps, summing, Differential, Integrator, differentiator Amplifier.

TEXT BOOKS:

1. Basic Electrical and Electronics Engineering, M.S.Sukhija, T.K.Nagsarkar, Oxford University Press, 1<sup>st</sup> Edition, 2012.
2. Basic Electrical and Electronics Engineering, S.K Bhattacharya, Pearson Education, 2012.

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	<b>3</b>	<b>1</b>	<b>0</b>	<b>3</b>

**(15A04306) DIGITAL LOGIC DESIGN****UNIT I**

**BINARY SYSTEMS:** Digital Systems, Binary Numbers, Number Base Conversions, Octal and Hexadecimal Numbers, Compliments, Signed Binary Numbers, Binary Codes, Binary Storage and Registers, Binary Logic.

**BOOLEAN ALGEBRA AND LOGIC GATES:** Basic Definitions, Axiomatic Definition of Boolean Algebra, Basic Theorems and properties of Boolean Algebra, Boolean Functions, Canonical and Standard Forms, Other Logic Operations, Digital Logic Gates, Integrated Circuits.

**UNIT II**

**GATE – LEVEL MINIMIZATION:** The Map Method, Four Variable Map, Five-Variable Map, Product of Sums Simplification, Don't-Care Conditions, NAND and NOR Implementation, Other Two Level Implementations, EX-OR Function, Other Minimization Methods

**UNIT III**

**COMBINATIONAL LOGIC:** Combinational Circuits, Analysis Procedure, Design Procedure, Binary Adder-Subtractor, Decimal Adder, Binary Multiplier, Magnitude Comparator, Decoders, Encoders, Multiplexers.

**UNIT IV**

**SYNCHRONOUS SEQUENTIAL LOGIC:** Sequential Circuits, Latches, Flip-Flops, Analysis of Clocked Sequential Circuits, State Reduction and Assignment, Design Procedure, Registers, Shift Registers, Ripple Counters, Synchronous Counters, Other counters.

**UNIT V**

**MEMORY AND PROGRAMMABLE LOGIC:** Random access memory, memory decoding, Error Detection and Correction, Read-only Memory, Programmable Logic Array, Programmable Array Logic.

**DIGITAL LOGIC CIRCUITS:** RTL and DTL Circuits, Transistor-Transistor Logic (TTL), Emitter-Coupled Logic (ECL), MOS, CMOS Logic, Comparisons of Logic Families.

**TEXT BOOKS:**

1. Digital Design, M.Morris Mano & Micheal D. Ciletti, Pearson, 5<sup>th</sup> Edition, 2013.
2. Digital Logic & State Machine Design, David J. Comer, Oxford University Press, 3<sup>rd</sup>

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Reprinted Indian Edition, 2012.

**REFERENCES:**

1. Digital Logic Design, R.D. Sudhakar Samuel, Elsevier
2. Fundamentals of Logic Design, 5/e, Roth, Cengage
3. Switching and Finite Automata Theory, 3/e, Kohavi, Jha, Cambridge.
4. Digital Logic Design, Leach, Malvino, Saha, TMH
5. Modern Digital Electronics, R.P. Jain, TMH

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	<b>3</b>	<b>1</b>	<b>0</b>	<b>3</b>

**(15A52301) MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS**

**Course Objectives:** The objective of this course is to equip the student with the basic inputs of Managerial Economics and Economic Environment of business and to impart analytical skills in helping them take sound financial decisions for achieving higher organizational productivity.

**Unit I: INTRODUCTION TO MANAGERIAL ECONOMICS**

Managerial Economics – Definition- Nature- Scope - Contemporary importance of Managerial Economics - Relationship of Managerial Economics with Financial Accounting and Management. **Demand Analysis:** Concept of Demand-Demand Function - Law of Demand - Elasticity of Demand- Significance - Types of Elasticity - Measurement of elasticity of demand - Demand Forecasting- factors governing demand forecasting- methods of demand forecasting.

**UNIT II: THEORY OF PRODUCTION AND COST ANALYSIS**

**Production Function-** Least cost combination- Short-run and Long- run production function- Isoquants and Isocosts, MRTS - Cobb-Douglas production function - Laws of returns - Internal and External economies of scale - **Cost Analysis:** Cost concepts and cost behavior- Break-Even Analysis (BEA) -Determination of Break Even Point (Simple Problems)-Managerial significance and limitations of Break- Even Point.

**UNIT III: INTRODUCTION TO MARKETS AND NEW ECONOMIC ENVIRONMENT**

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**Market structures:** Types of Markets - Perfect and Imperfect Competition - Features of Perfect Competition- Monopoly-Monopolistic Competition-Oligopoly-Price-Output Determination - Pricing Methods and Strategies-Forms of Business Organizations- Sole Proprietorship- Partnership – Joint Stock Companies - Public Sector Enterprises – New Economic Environment- Economic Liberalization – Privatization - Globalization.

#### **UNIT IV: INTRODUCTION TO FINANCIAL ACCOUNTING AND ANALYSIS**

Financial Accounting – Concept - Emerging need and Importance - Double-Entry Book Keeping- Journal - Ledger – Trial Balance - Financial Statements - Trading Account – Profit & Loss Account – Balance Sheet (with simple adjustments). Financial Analysis – Ratios – Liquidity, Leverage, Profitability, and Activity Ratios (simple problems).

#### **UNIT V: CAPITAL AND CAPITAL BUDGETING**

Concept of Capital - Over and Undercapitalization – Remedial Measures - Sources of Short term and Long term Capital - Estimating Working Capital Requirements – Capital Budgeting – Features of Capital Budgeting Proposals – Methods and Evaluation of Capital Budgeting Projects – Pay Back Method – Accounting Rate of Return (ARR) – Net Present Value (NPV) – Internal Rate Return (IRR) Method (simple problems)

**Learning Outcome:** After completion of this course, the student will be able to understand various aspects of Managerial Economics and analysis of financial statements and inputs therein will help them to make sound and effective decisions under different economic environment and market situations.

#### **TEXT BOOKS:**



1. Managerial Economics 3/e, Ahuja H.L, S.Chand, 2013.
2. Financial Management, I.M.Pandey, Vikas Publications, 2013.

**REFERENCES**

1. Managerial Economics and Financial Analysis, 1/e, Aryasri, TMH, 2013.
2. Managerial Economics and Financial Analysis, S.A. Siddiqui and A.S. Siddiqui, New Age International, 2013.

Accounting and Financial Mangement, T.S.Reddy & Y. Hariprasad Reddy, Margham Publishers.

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**(15A05303) DATABASE MANAGEMENT SYSTEMS LABORATORY****Course Objectives:**

- To create a database and query it using SQL, design forms and generate reports.
- Understand the significance of 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

**List of Experiments:**

1. Practice session: Students should be allowed to choose appropriate DBMS software, install it, configure it and start working on it. Create sample tables, execute some queries, use SQLPLUS features, use PL/SQL features like cursors on sample database. Students should be permitted to practice appropriate User interface creation tool and Report generation tool.
2. A college consists of number of employees working in different departments. In this context, create two tables **employee** and **department**. Employee consists of columns empno, empname, basic, hra, da, deductions, gross, net, date-of-birth. The calculation of hra,da are as per the rules of the college. Initially only empno, empname, basic have valid values. Other values are to be computed and updated later. Department contains deptno, deptname, and

description columns. Deptno is the primary key in department table and referential integrity constraint exists between employee and department tables. Perform the following operations on the the database:

- Create tables department and employee with required constraints.
- Initially only the few columns (essential) are to be added. Add the remaining columns separately by using appropriate SQL command
- Basic column should not be null
- Add constraint that basic should not be less than 5000.
- Calculate hra,da,gross and net by using PL/SQL program.
- Whenever salary is updated and its value becomes less than 5000 a trigger has to be raised preventing the operation.
- The assertions are: hra should not be less than 10% of basic and da should not be less than 50% of basic.
- The percentage of hra and da are to be stored separately.
- When the da becomes more than 100%, a message has to be generated and with user permission da has to be merged with basic.
- Empno should be unique and has to be generated automatically.
- If the employee is going to retire in a particular month, automatically a message has to be generated.
- The default value for date-of-birth is 1 jan, 1970.
- When the employees called daily-wagers are to be added the constraint that salary should be greater than or equal to 5000 should be dropped.
- Display the information of the employees and departments with description of the fields.
- Display the average salary of all the departments.
- Display the average salary department wise.
- Display the maximum salary of each department and also all departments put together.
- Commit the changes whenever required and rollback if necessary.
- Use substitution variables to insert values repeatedly.
- Assume some of the employees have given wrong information about date-of-birth. Update the corresponding tables to change the value.

- Find the employees whose salary is between 5000 and 10000 but not exactly 7500.
- Find the employees whose name contains 'en'.
- Try to delete a particular deptno. What happens if there are employees in it and if there are no employees.
- Create alias for columns and use them in queries.
- List the employees according to ascending order of salary.
- List the employees according to ascending order of salary in each department.
- Use '&&' wherever necessary
- Amount 6000 has to be deducted as CM relief fund in a particular month which has to be accepted as input from the user. Whenever the salary becomes negative it has to be maintained as 1000 and the deduction amount for those employees is reduced appropriately.
- The retirement age is 60 years. Display the retirement day of all the employees.
- If salary of all the employees is increased by 10% every year, what is the salary of all the employees at retirement time.
- Find the employees who are born in leap year.
- Find the employees who are born on feb 29.
- Find the departments where the salary of atleast one employee is more than 20000.
- Find the departments where the salary of all the employees is less than 20000.
- On first January of every year a bonus of 10% has to be given to all the employees. The amount has to be deducted equally in the next 5 months. Write procedures for it.
- As a designer identify the views that may have to be supported and create views.
- As a designer identify the PL/SQL procedures necessary and create them using cursors.

Use appropriate Visual programming tools like oracle forms and reports, visual basic etc to create user interface screens and generate reports.

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**Note:** As a designer identify other operations that may be required and add to the above list. The above operations are not in order. Order them appropriately. Use SQL or PL/SQL depending on the requirement.

3. Students may be divided into batches and the following experiments may be given to them to better understand the DBMS concepts. Students should gather the required information, draw ER diagrams, map them to tables, normalize, create tables, triggers, procedures, execute queries, create user interfaces, and generate reports.
  - Student information system
  - APSRTC reservation system
  - Hostel management
  - Library management
  - Indian Railways reservation
  - Super market management
  - Postal system
  - Banking system
  - Courier system
  - Publishing house system

**References:**

1. "Oracle Database 11g PL/SQL Programming", M.Mc Laughlin, TMH.
2. "Learning Oracle SQL and PL/SQL", Rajeeb C. Chatterjee, PHI.
3. "Introduction to SQL", Rick F.Vander Lans, Pearson education.
4. "Oracle PL/SQL", B.Rosenzweig and E.Silvestrova, Pearson education.

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR****B. Tech II-I Sem. (CSE)**

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**(15A99302) BASIC ELECTRICAL AND ELECTRONICS LABORATORY****PART – A****BASIC ELECTRICAL ENGINEERING LAB****OBJECTIVES:** The student has to learn about:

- Practical verification of Superposition and Thevenin's theorem
- Experimental determination of O.C. and S.C. parameters of two – port network
- Swinburne's Test on DC Shunt Machine and Predetermination of Efficiency of a Given DC Shunt Machine (i) while working as a Motor and (ii) while working as a Generator
- Brake Test on DC Shunt Motor and determination of Performance Characteristics
- OC & SC Tests on Single-Phase Transformer and Predetermination of Efficiency and Regulation at any given load and Power Factor.

**PART- A : ELECTRICAL LAB**

1. Verification of Superposition Theorem.
2. Verification of Thevenin's Theorem.
3. Determination of Open circuit and Short circuit parameters of two – port network.
4. Swinburne's Test on DC Shunt Machine (Predetermination of Efficiency of a Given DC Shunt Machine Working as Motor and Generator).
5. Brake Test on DC Shunt Motor. Determination of Performance Characteristics.
6. OC & SC Tests on Single-Phase Transformer (Predetermination of Efficiency and Regulation at any given load and Power Factor).

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**OUTCOMES:** At the end of the course the student should be able to

- Practically verify Superposition and Thevenin's theorem.
- Experimentally determine the O.C. and S.C. parameters of two-port network.
- Conduct Swinburne's Test on DC Shunt Machine and Predetermine the Efficiency of a given DC Shunt Machine (i) while working as a Motor and (ii) while working as a Generator
- Conduct Brake Test on DC Shunt Motor and determine the Performance Characteristics
- Conduct OC & SC Tests on Single-Phase Transformer and Predetermine the Efficiency and Regulation at any given load and Power Factor.

**PART – B****ELECTRONICS LABORATORY  
(Any Six Experiments)**

1. P-N Junction Diode and Zener Diode Volt-Ampere Characteristics.
2. Bipolar Junction Transistor in CB Configuration-Input and Output Characteristics, Computation of  $\alpha$ .
3. Half-Wave Rectifier- a) Without Filter b) With Capacitor Filter.
4. Full-Wave Rectifier- a) Without Filter b) With Capacitor Filter.
5. Bipolar Junction Transistor in CE Configuration-Input and Output Characteristics, Computation of  $\beta$ .
6. Junction field effect Transistor in Common Source Configuration Output and Transfer Characteristics.
7. Verification of Logic Gates- AND, OR, NOT, NAND, NOR, EX-OR, EX-NOR.



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	<b>3</b>	<b>1</b>	<b>0</b>	<b>3</b>

**(15A54401) PROBABILITY AND STATISTICS****(Common to CSE, IT, Civil, Mech.)**

**Objectives:** To help the students in getting a thorough understanding of the fundamentals of probability and usage of statistical techniques like testing of hypothesis, Statistical Quality Control and Queuing theory

**UNIT – I**

Basic concepts of Probability – Random variables – Expectation – Discrete and continuous Distributions – Distribution functions. Binomial and poison distributions Normal distribution – Related properties.

**UNIT – II**

Test of Hypothesis: Population and Sample - Confidence interval of mean from Normal distribution - Statistical hypothesis - Null and Alternative hypothesis - Level of significance. Test of significance - Test based on normal distribution - Z test for means and proportions.

**UNIT – III**

Small samples - t- test for one sample and two sample problem and paired t-test, F-test and Chi-square test (testing of goodness of fit and independence).

**UNIT – IV**

Statistical Quality Control: Concept of quality of a manufactured product -Defects and Defectives - Causes of variations - Random and assignable - The principle of Shewhart Control Chart-Charts for attribute and variable quality characteristics- Constructions and operation of  $\bar{X}$  - Chart, R-Chart, p - Chart and C-Chart.

**UNIT – V**

Queuing Theory: Pure Birth and Death process, M/M/1 & M/M/S & their related simple problems.

**TEXT BOOKS:**

1. Probability & Statistics by E. Rukmangadachari & E. Keshava Reddy, Pearson Publisher.
2. Probability & Statistics for engineers by Dr. J. Ravichandran WILEY-INDIA publishers.

**REFERENCES:**

1. Probability & Statistics by T.K.V. Iyengar, B.Krishna Gandhi, S.Ranganatham and M.V.S.S.N.Prasad, S.Chand publications.
2. Statistical methods by S.P. Gupta, S.Chand publications.
3. Probability & Statistics for Science and Engineering by G.Shanker Rao, Universities Press.
4. Probability and Statistics for Engineering and Sciences by Jay L.Devore, CENGAGE.
5. Probability and Statistics by R.A. Jhonson and Gupta C.B.

**Outcomes:** The student will be able to analyze the problems of engineering & industry using the techniques of testing of hypothesis, Statistical Quality Control and Queuing theory and draw appropriate inferences.

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**(15A05401) SOFTWARE ENGINEERING**
**Course Objectives**

- To understand the software life cycle models.
- To understand the software requirements and SRS document.
- To understand the importance of modeling and modeling languages.
- To design and develop correct and robust software products.
- To understand the quality control and how to ensure good quality software.
- To understand the planning and estimation of software projects.
- To understand the implementation issues, validation and verification procedures.
- To understand the maintenance of software

**Course Outcomes**

- Define and develop a software project from requirement gathering to implementation.
- Ability to code and test the software
- Ability to plan, Estimate and Maintain software systems

**Unit I:**

**Software and Software Engineering:** The Nature of Software, The Unique Nature of WebApps, Software Engineering, The Software Process, Software Engineering Practice, Software Myths

**Process Models:** A Generic Process Model, Process Assessment and Improvement, Prescriptive Process Models, Specialized Process Models, The Unified Process, Personal and Team Process Models, Process Technology, Product and Process.

**Agile Development:** Agility, Agility and the Cost of Change, Agile Process, Extreme Programming, Other Agile Process Models

**Unit II:**

**Understanding Requirements:** Requirements Engineering, Establishing the groundwork, Eliciting Requirements, Developing Use Cases, Building the requirements model, Negotiating Requirements, Validating Requirements.

**Requirements Modeling (Scenarios, Information and Analysis Classes):** Requirements Analysis, Scenario-Based Modeling, UML Models that Supplement the Use Case, Data Modeling Concepts, Class-Based Modeling.

**Requirements Modeling (Flow, Behavior, Patterns and WEBAPPS):** Requirements Modeling Strategies, Flow-Oriented Modeling, Creating a Behavioral Model, Patterns for Requirements Modeling, Requirements Modeling for WebApps.

**Unit III:**

**Design Concepts:** Design with Context of Software Engineering, The Design Process, Design Concepts, The Design Model.

**Architectural Design:** Software Architecture, Architecture Genres, Architecture Styles, Architectural Design, Assessing Alternative Architectural Designs, Architectural Mapping Using Data Flow.

**Component-Level Design:** Component, Designing Class-Based Components, Conducting Component-level Design, Component Level Design for WebApps, Designing Traditional Components, Component-Based Development.

**Unit IV:**

**User Interface Design:** The Golden Rules, User Interface Analysis and Design, Interface Analysis, Interface Design Steps, WebApp Interface Design, Design Evaluation.

**WebApp Design:** WebApp Design Quality, Design Goal, A Design Pyramid for WebApps, WebApp Interface Design, Aesthetic Design, Content Design, Architecture Design, Navigation Design, Component-Level Design, Object-Oriented Hypermedia Design Method(OOHMD).

**Unit V:**

**Software Testing Strategies:** A strategic Approach to Software Testing, Strategic Issues, Test Strategies for Conventional Software, Test Strategies for Object-Oriented Software, Test Strategies for WebApps, Validation Testing, System Testing, The Art of Debugging.

**Testing Conventional Applications:** Software Testing Fundamentals, Internal and External Views of Testing, White-Box Testing, basic Path testing, Control Structure Testing, Black-Box Testing, Model-based Testing, Testing for Specialized Environments, Architectures and Applications, Patterns for Software Testing. Testing Object-Oriented Applications: Broadening the View of Testing, Testing with OOA and OOD Models, Object-Oriented Testing Strategies, Object-Oriented Testing Methods, Testing Methods Applicable at the Class level, Interclass Test-Case Design.

**Textbook:**

1. "Software engineering A practitioner's Approach", Roger S. Pressman, McGraw Hill International Education, Seventh Edition, 2016.

**Reference Textbooks:**

1. Fundamentals of Software Engineering, Fourth Edition, Rajib Mall, PHI,
2. Software Engineering, Ninth Edition, IAN Sommerville, Pearson, Ninth edition.
3. Software Engineering, A Precise Approach, Pankaj Jalote, Wiley India, 2010.
4. Software Engineering, Principles and Practices, Deepak Jain, Oxford University Press.
5. Software Engineering1: Abstraction and modeling, Diner Bjorner, Springer International edition, 2006.
6. Software Engineering2: Specification of systems and languages, Diner Bjorner, Springer International edition, 2006.
7. Software Engineering Foundations, Yingxu Wang, Auerbach Publications, 2008.

8. Software Engineering Principles and Practice, Hans Van Vliet, 3<sup>rd</sup> edition, John Wiley & Sons Ltd.
9. Software Engineering 3: Domains, Requirements, and Software Design, D. Björner, Springer International Edition.
10. Introduction to Software Engineering R.J. Leach, CRC Press

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	<b>3</b>	<b>1</b>	<b>0</b>	<b>3</b>

**(15A05402) COMPUTER ORGANIZATION****Course Objectives:**

- To learn the fundamentals of computer organization and its relevance to classical and modern problems of computer design
- To make the students understand the structure and behavior of various functional modules of a computer.
- To understand the techniques that computers use to communicate with I/O devices
- To study the concepts of pipelining and the way it can speed up processing.
- To understand the basic characteristics of multiprocessors

**Course Outcomes:**

- Ability to use memory and I/O devices effectively
- Able to explore the hardware requirements for cache memory and virtual memory
- Ability to design algorithms to exploit pipelining and multiprocessors

**Unit I:**

**Basic Structure of Computer:** Computer Types, Functional Units, Basic operational Concepts, Bus Structure, Software, Performance, Multiprocessors and Multicomputer.

**Machine Instructions and Programs:** Numbers, Arithmetic Operations and Programs, Instructions and Instruction Sequencing, Addressing Modes, Basic Input/output Operations, Stacks and Queues, Subroutines, Additional Instructions.

**Unit II:**

**Arithmetic:** Addition and Subtraction of Signed Numbers, Design and Fast Adders, Multiplication of Positive Numbers, Signed-operand Multiplication, Fast Multiplication, Integer Division, Floating-Point Numbers and Operations.

**Basic Processing Unit:** Fundamental Concepts, Execution of a Complete Instruction, Multiple-Bus Organization, Hardwired Control, Multiprogrammed Control.

**Unit III:**

**The Memory System:** Basic Concepts, Semiconductor RAM Memories, Read-Only Memories, Speed, Size and Cost, Cache Memories, Performance Considerations, Virtual Memories, Memory Management Requirements, Secondary Storage.

**Unit IV:**

**Input/output Organization:** Accessing I/O Devices, Interrupts, Processor Examples, Direct Memory Access, Buses, Interface Circuits, Standard I/O Interfaces.

**Unit V:**

**Pipelining:** Basic Concepts, Data Hazards, Instruction Hazards, Influence on Instruction Sets.

**Large Computer Systems:** Forms of Parallel Processing, Array Processors, The Structure of General-Purpose, Interconnection Networks.

**Textbook:**

1) "Computer Organization", Carl Hamacher, Zvonko Vranesic, Safwat Zaky, McGraw Hill Education, 5<sup>th</sup> Edition, 2013.

**Reference Textbooks:**

1. Computer System Architecture, M.Morris Mano, Pearson Education, 3<sup>rd</sup> Edition.
2. Computer Organization and Architecture, Themes and Variations, Alan Clements, CENGAGE Learning.
3. Computer Organization and Architecture, Smruti Ranjan Sarangi, McGraw Hill Education.
4. Computer Architecture and Organization, John P.Hayes, McGraw Hill Education.



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**(15A04407) MICROPROCESSORS & INTERFACING****Course Objective:**

- *Study the instruction set of 8086 microprocessor and its architecture*
- *Learn assembly language programming using 8086 microprocessor*
- *Interfacing 8051, 8255, 8237, and 8259*

**Learning Outcome:**

- *Program the 8086 microprocessor*
- *Interface the 8086 microprocessor with various devices and program them*

**UNIT I**

Microprocessors-Evolution and Introduction: Microprocessors and Micro Controllers, Microprocessor based system, Origin of Microprocessor, Classification of Microprocessors, Types of Memory, I/O Devices, Technology Improvements Adapted to Microprocessors and Computers, Introduction to 8085 processor, Architecture of 8085, Microprocessor instructions, classification of instructions, Instruction set of 8085.

Intel 8086 Microprocessor architecture, Features, and Signals: Architecture of 8086, Accessing memory locations, PIN details of 8086.

**UNIT II**

Addressing Modes, Instruction Set and Programming of 8086: Addressing modes in 8086, Instruction set of 8086, 8086 Assembly Language Programming, Modular Programming.

**UNIT III**

8086 Interrupts: Interrupt types in 8086, Processing of Interrupts by 8086, Dedicated interrupt types in 8086, Software interrupts-types 00H-FFH, Priority among 8086 interrupts, Interrupt service routines, BIOS interrupts or functional calls, Interrupt handlers, DOS services-INT 21H, System calls-BIOS services.

Memory and I/O Interfacing: Physical memory organization in 8086, Formation of system bus, Interfacing RAM and EPROM chips using only logic gates, Interfacing RAM/ EPROM chips using decoder IC and logic gates, I/O interfacing, Interfacing 8-bit input device with 8086, Interfacing output device using 8086, Interfacing printer with 8086, Interfacing 8-bit and 16-bit I/O devices or ports with 8086, Interfacing CRT terminal with 8086.

**UNIT IV**

Features and Interfacing of programmable devices for 8086 systems: Intel 8255 programmable peripheral interface, Interfacing switches and LEDs, Interfacing seven segment displays, Traffic light control, Interfacing analog to digital converters, Intel Timer IC 8253, Introduction to serial communication, 8259 programmable controller, 8237 DMA controller.

**UNIT V**

Introduction to 8051 Micro controllers: Intel's MCS-51 series micro controllers, Intel 8051 architecture, Memory organization, Internal RAM structure, Power control in 8051, Stack operation.

8051, Hardware features of 8051: Introduction, Parallel ports in 8051, External memory interfacing in 8051, Timers, Interrupts, Serial ports.

Interfacing Examples: Interfacing 8255 with 8051, Interfacing of push button switches and LEDs, Interfacing of seven segment displays.

**Text Books:**

- *“Microprocessor and Interfacing 8086,8051, 8096 and advanced processors”, Senthil Kumar, Saravanan, Jeevanathan, Shah, 1<sup>st</sup> edition, 2<sup>nd</sup> impression, 2012, Oxford University Press.*
- *“The X86 Microprocessors”, Lyla B. Das. , 2010, Pearson.*

**Reference Books:**

1. *“Microprocessor and Interfacing: Programming and Hardware”, Douglas V.Hall, McGrawHill*
2. *“8086 microprocessor: Programming and Interfacing the PC”, Kenneth Ayala, Cengage Learning*
3. *“ARM system-on-chip architecture”, Steve Furber, Addison-Wesley Professional*
4. *“The Intel Microprocessors”, Barry B. Brey, Prentice Hall*

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**(15A05403) OBJECT ORIENTED PROGRAMMING USING JAVA****Course Objectives:**

- Study the syntax, semantics and features 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:**

- Ability to solve problems using object oriented approach and implement them using Java
- Ability to write Efficient programs with multitasking ability and 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 byte code, Servlets: java on the server side, java Buzzwords, Evolution of java.

**An Overview of Java:**

Object Oriented Programming, Two control statements, Using blocks of codes, Lexical issues,  
The java class Libraries.

**Data Types, Arrays and Variables:**

Primitive Types, Integers, Floating-point Types, Characters, Booleans, literals, variables, Type conversion and casting, Automatic Type Promotion in Expressions, Arrays, strings, Pointers.

**UNIT II:****Operators:**

Arithmetic Operators, The Bitwise Operators, Relational Operators, Boolean Logic operators, The assignment operator, The ? Operator, Operator Precedence, Using Parentheses.

**Control Statements:**

Java's selection Statements, Iteration statements, Jump Statements.

**Introducing Classes:**

Class Fundamentals, Declaring Objects, Assuming Object reference Variables, Introducing Methods, Constructors, The this Keyword, Garbage Collection, The Finalize() method, A

Stack class. Overloading Methods, Using Object as Parameter, Argument Passing, Returning Objects, Recursion, Introducing Access control, Understanding static, Introducing Nested and Inner classes, Exploring the String class, Using Command line Arguments, Varargs: variable-Length Arguments.

**UNIT III:**

**Inheritance:** Basics, Using super, creating a multi level hierarchy, when constructors are executed, method overriding, dynamic method dispatch, using abstract class, using final with inheritance, the object class.

**Packages and Interfaces:**

Packages, Access protection, Importing Packages, Interfaces, Default 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 Built-in Exceptions, Creating your own exception subclasses, Chained Exceptions, Three Recently added Exceptions features, Using Exceptions.

**UNIT IV:****Multithreaded Programming:**

The java Thread Model, The main thread , Creating Thread, Creating Multiple Threads, Using `isAlive()` and `join()`, Thread Priorities, Synchronization, Interthread Communication, Suspending, resuming and stopping threads, Obtaining a thread state, Using Multithreading.

**I/O, Applets, and Other Topics:**

I/O basics, Reading Console input, Writing console Output, The `PrintWriter` class, Reading and writing files, Automatically closing a file, Applet fundamentals, enumerations type wrappers auto boxing annotations, Generics: The general form of a generics class, creating a generic method, generics interfaces.

**UNIT V:****Introduction the AWT: Working with windows, graphics and Text:**

AWT classes, window fundamentals, working with frame windows, creating a frame window in a an AWT Based applet, creating a window program, displaying information within a window, Graphics, working with color, setting the paint mode, working with fonts, managing text output using font metrics,.

**Using AWT controls, Layout Mangers, and Menus:**

AWT control fundamentals, Labels, using buttons, applying check boxes, check box group, choice controls, using lists, Managing scroll bars, using a Text field, Using a Text area, understanding layout managers, Menu bars and Menus, dialog boxes, file dialog, Overriding `paint()`.

**TEXT BOOKS:**

1."Java The Complete Reference", Herbert Schildt, MC GRAW HILL Education, 9<sup>th</sup> Edition,2016.

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**REFERENCE BOOKS:**

1. "Programming with Java" T.V.Suresh Kumar, B.Eswara Reddy, P.Raghavan Pearson Edition.
  2. "Java Fundamentals - A Comprehensive Introduction", Herbert Schildt and Dale Skrien, Special Indian Edition, McGrawHill, 2013.
  3. "Java – How to Program", Paul Deitel, Harvey Deitel, PHI.
  4. "Core Java", NageswarRao, Wiley Publishers.
  5. "Thinking in Java", Bruce Eckel, Pearson Education.
  6. "A Programmers Guide to Java SCJP", Third Edition, Mughal, Rasmussen, Pearson.
- "Head First Java", Kathy Sierra, Bert Bates, O'Reilly "SCJP – Sun Certified Programmer for Java Study guide" – Kathy Sierra, Bert Bates, McGrawHill

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B. Tech II-II Sem. (CSE)	L	T	P	C
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**(15A05404) FORMAL LANGUAGES AND AUTOMATA THEORY**
**Course Objective:**

- Understand formal definitions of machine models.
- Classify machines by their power to recognize languages.
- Understanding of formal grammars, analysis
- Understanding of hierarchical organization of problems depending on their complexity
- Understanding of the logical limits to computational capacity
- Understanding of undecidable problems

**Learning Outcome:**

At the end of the course, students will be able to

- Construct finite state diagrams while solving problems of computer science
- Find solutions to the problems using Turing machines
- Design of new grammar and language

**UNIT I**

**Introduction:** Basics of set theory, Relations on sets, Deductive proofs, Reduction to definitions, Other theorem forms, Proving equivalences about sets, The Contrapositive, Proof by contradiction, Counter examples, Inductive proofs, Alphabets, Strings, Languages, Problems, Grammar formalism, Chomsky Hierarchy

**Finite Automata:** An Informal picture of Finite Automata, Deterministic Finite Automata (DFA), Non Deterministic Finite Automata (NFA), Applying FA for Text search, Finite Automata with

Epsilon transitions ( $\epsilon$ -NFA or NFA- $\epsilon$ ), Finite Automata with output, Conversion of one machine to another, Minimization of Finite Automata, Myhill-Nerode Theorem.

**UNIT II**

**Regular Languages:** Regular Expressions (RE), Finite Automata and Regular Expressions,

Applications of Regular Expressions, Algebraic laws for Regular Expressions, The Arden's Theorem, Using Arden's theorem to construct RE from FA, Pumping Lemma for RLs, Applications of Pumping Lemma, Equivalence of Two FAs, Equivalence of Two REs, Construction of Regular Grammar from

RE, Constructing FA from Regular Grammar, Closure properties of RLs, Decision problem's of RLS,

Applications of REs and FAs

**UNIT III**

**Context Free Grammars and Languages:** Definition of Context Free Grammars (CFG), Derivations and Parse trees, Ambiguity in CFGs, Removing ambiguity, Left recursion and Left factoring, Simplification of CFGs, Normal Forms, Linear grammars, Closure properties for CFLs, Pumping Lemma for CFLs, Decision problems for CFLs, CFG and Regular Language..

**UNIT IV**

**Push Down Automata (PDA):** Informal introduction, The Formal Definition, Graphical notation, Instantaneous description, The Languages of a PDA, Equivalence of PDAs and CFGs, Deterministic Push Down Automata, Two Stack PDA.

**UNIT V**

**Turing Machines and Undecidability:** Basics of Turing Machine (TM), Transitional Representation of TMs, Instantaneous description, Non Deterministic TM, Conversion of Regular Expression to TM, Two stack PDA and TM, Variations of the TM, TM as an integer function, Universal TM, Linear Bounded Automata, TM Languages, Unrestricted grammar , Properties of Recursive and Recursively enumerable languages, Undecidability, Reducibility, Undecidable problems about TMs, Post's Correspondence Problem(PCP), Modified PCP.



**Text Books:**

1. *Introduction to Automata Theory, Formal Languages and Computation*, Shyamalendu kandar, Pearson.
2. *Introduction to Automata Theory, Languages, and Computation, Third Edition*, John E.Hopcroft, Rajeev Motwani, Jeffery D. Ullman, Pearson.

**Reference Books:**

1. *Introduction to Languages and the Theory of Computation*, John C Martin, TMH, Third Edition.
2. *Theory of Computation*, Vivek Kulkarni, OXFORD.
3. *Introduction to the Theory of Computation.*, Michel Sipser, 2<sup>nd</sup> Edition, Cengage Learning
4. *Theory of computer Science Automata, Languages and Computation*, K.L.P. Mishra, Chandrasekaran, PHI, Third Edition.
5. *Fundamentals of the Theory of Computation, Principles and Practice*, Raymond Greenlaw, H. James Hoover, Elsevier, Morgan Kaufmann.
6. *Finite Automata and Formal Language A Simple Approach*, A.M. Padma Reddy, Pearson

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR**

B. Tech II-II Sem. (CSE) L T P C  
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**(15A04408) MICRO PROCESSORS & INTERFACING LAB****Course Objective:**

- *To become skilled in 8086 Assembly Language programming.*
- *To understand programmable peripheral devices and their Interfacing.*
- *To understand and learn 8051 microcontroller.*
- *To learn 8051 assembly Language programming*

**Learning Outcome:**

- *Able to write 8086 Assembly Language programs.*
- *Able to understand programmable peripheral devices and their Interfacing.*
- *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:**

1. 8259 – Interrupt Controller and its interfacing programs
2. 8255 – PPI and its interfacing programs (A/D, D/A, stepper motor,)
3. 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:**

1. Key board Interfacing
2. Seven Segment display
3. Switch Interfacing
4. Relay Interfacing
5. UART

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<b>B. Tech II-II Sem. (CSE)</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
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**(15A05405) JAVA PROGRAMMING LABORATORY****Course Objectives:**

- Learn to use object orientation to solve problems and use java language to implement them.
- To experiment with the syntax and semantics of java language and gain experience with java programming

**Course Outcomes:**

- Ability to write portable programs which work in all environments
- Ability to create user friendly interfaces
- Ability to solve the problem using object oriented approach and design solutions which are robust

**List of Experiments**

- 1) Preparing and practice – Installation of Java software, study of any Integrated development environment, sample programs on operator precedence and associativity, class and package concept, scope concept, control structures, constructors and destructors. Learn to compile, debug and execute java programs.
- 2) Write Java program(s) on use of inheritance, preventing inheritance using final, abstract classes.
- 3) Write Java program(s) on dynamic binding, differentiating method overloading and overriding.
- 4) Write Java program(s) on ways of implementing interface.
- 5) Write a program for the following
  - Develop an applet that displays a simple message.
  - Develop an applet for waving a Flag using Applets and Threads.
- 6) Write Java program(s) which uses the exception handling features of the

- language, creates exceptions and handles them properly, uses the predefined exceptions, and create own exceptions
- 7) Write java program that inputs 5 numbers, each between 10 and 100 inclusive. As each number is read display it only if it's not a duplicate of any number already read. Display the complete set of unique values input after the user enters each new value.

Write Java program(s) on creating multiple threads, assigning priority to threads, synchronizing threads, suspend and resume threads

- 10) Write a java program to split a given text file into n parts. Name each part as the name of the original file followed by .part<n> where n is the sequence number of the part file.
- 11) Write a java program to create a super class called Figure that receives the dimensions of two dimensional objects. It also defines a method called area that computes the area of an object. The program derives two subclasses from Figure. The first is Rectangle and second is Triangle. Each of the sub classes override area() so that it returns the area of a rectangle and triangle respectively.
- 12) Write a Java program that creates three threads. First thread displays "Good Morning" every one second, the second thread displays "Hello" every two seconds and the third thread displays "Welcome" every three seconds
- 13) Design a simple calculator which performs all arithmetic operations. The interface should look like the calculator application of the operating system. Handle the exceptions if any.
- 14) Write a java program to handle mouse events
- 15) Write a java program to handle keyboard events
- 16) Write a java program that allows conduction of object type examination containing multiple choice questions, and true/false questions. At the end of the examination when the user clicks a button the total marks have to be displayed in the form of the message.
- 17) Write a java program that creates menu which appears similar to the menu of notepad application of the Microsoft windows or any editor of your choice.
- 18) Write a java program that creates dialog box which is similar to the save dialog box of the Microsoft windows or any word processor of your choice.
- 19) Write a Java program that correctly implements producer consumer problem using the concept of inter thread communication
- 20) Write a java program to find and replace pattern in a given file.
- 21) Use inheritance to create an exception super class called ExceptionA and exception sub classes ExceptionB and ExceptionC, where ExceptionB inherits from ExceptionA and ExceptionC inherits from ExceptionB. Write a java program

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to demonstrate that the catch block for type ExceptionA catches exception of type ExceptionB and ExceptionC.

22) Write a Java program which opens a connection to standard port on well known server, sends the data using socket and prints the returned data.

23) Write a Java program to create a URLConnection and use it to examine the documents properties and content.

24) Write a Java program which uses TCP/IP and Datagrams to communicate client and server.

25) Create an interface for stack with push and pop operations. Implement the stack in two ways: fixed size stack and Dynamic stack (stack size is increased when stack is full).

26) Create multiple threads to access the contents of a stack. Synchronize thread to prevent simultaneous access to push and pop operations.

**References:**

1. "Java: How to Program", P.J.Deitel and H.M.Deitel, PHI.
2. "Object Oriented Programming through Java", P.Radha Krishna, Universities Press.
3. "Thinking in Java", Bruce Eckel, Pearson Education
4. "Programming in Java", S.Malhotra and S.Choudhary, Oxford Univ. Press.

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B. Tech III-I Sem. (CSE)	L	T	P	C
15A05501	3	1	0	3
	<b>OPERATING SYSTEMS</b>			

**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.

**Course Outcomes:**

- Able to use operating systems effectively.
- Write System and application programs to exploit operating system functionality.
- 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, Computing Environments, Open- Source Operating Systems

**System Structures:** 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 Silberchatz, Peter B. Galvin, Greg Gagne, Wiley , Eight Edition, 2014.

**Reference Books:**

1. Operating systems by A K Sharma, Universities Press,
2. Operating Systems, S.Haldar, A.A.Aravind, Pearson Education.
3. Modern Operating Systems, Andrew S Tanenbaum, Second Edition, PHI.
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.
8. Principles of Operating Systems, B.L.Stuart, Cengage learning, India Edition.
9. Operating System Desgin, Douglas Comer, CRC Press, 2<sup>nd</sup> Edition.

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR**

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<b>15A05502</b>	<b>3</b>	<b>1</b>	<b>0</b>	<b>3</b>
<b>COMPUTER NETWORKS</b>				

**Course Objectives:**

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

**Course Outcomes:**

- Ability to choose the transmission media depending on the requirements.
- Ability to design new protocols for computer network.
- Ability to configure a computer network logically.

**Unit I**

**Introduction:** Networks, Network Types, Internet History, Standards and Administration, Network Models: Protocol Layering, TCP/IP Protocol Suite, The ISO Model.

**The Physical layer:** Data and Signals, Transmission impairment, Data rate limits, Performance, Transmission media: Introduction, Guided Media, Unguided Media, Switching: Introduction, Circuit Switched Networks, Packet switching.

**Unit II**

**The Data Link Layer:** Introduction, Link layer addressing, Error detection and Correction: Cyclic codes, Checksum, Forward error correction, Data link control: DLC Services, Data link layer protocols, HDLC, Point to Point Protocol, Media Access control: Random Access, Controlled Access, Channelization, Connecting devices and virtual LANs: Connecting Devices.

**Unit III**

**The Network Layer:** Network layer design issues, Routing algorithms, Congestion control algorithms, Quality of service, Internetworking, The network layer in the Internet: IPV4 Addresses, IPV6, Internet Control protocol, OSPF, BGP, IP, ICMPv4, IGMP.

**Unit IV**

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**The Transport Layer:** The Transport Service, Elements of Transport Protocols, Congestion Control, The internet transport protocols: UDP, TCP, Performance problems in computer networks, Network performance measurement.

**Unit V**

**The Application Layer:** Introduction, Client Server Programming, WWW and HTTP, FTP, e-mail, TELNET, Secure Shell, Domain Name System, SNMP.

**Text Books:**

1. "Data communications and networking", Behrouz A. Forouzan, Mc Graw Hill Education, 5<sup>th</sup> edition, 2012.
2. "Computer Networks", Andrew S. Tanenbaum, Wetherall, Pearson, 5<sup>th</sup> edition, 2010.

**References:**

1. Data Communication and Networks, Bhushan Trivedi, Oxford
2. "Internetworking with TCP/IP – Principles, protocols, and architecture- Volume 1, Douglas E. Comer, 5<sup>th</sup> edition, PHI
3. "Computer Networks", 5E, Peterson, Davie, Elsevier.
4. "Introduction to Computer Networks and Cyber Security", Chawan- Hwa Wu, Irwin, CRC Publications.
5. "Computer Networks and Internets with Internet Applications", Comer.

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<b>15A05503</b>	<b>OBJECT ORIENTED ANALYSIS &amp; DESIGN</b>			

**Course Objectives**

- To understand how to solve complex problems
- Analyze and design solutions to problems using object oriented approach
- Study the notations of Unified Modeling Language

**Course Outcomes:**

- Ability to find solutions to the complex problems using object oriented approach
- Represent classes, responsibilities and states using UML notation
- Identify classes and responsibilities of the problem domain

**Unit-I**

**Introduction:** The Structure of Complex systems, The Inherent Complexity of Software, Attributes of Complex System, Organized and Disorganized Complexity, Bringing Order to Chaos, Designing Complex Systems, Evolution of Object Model, Foundation of Object Model, Elements of Object Model, Applying the Object Model.

**Unit-II**

**Classes and Objects:** Nature of object, Relationships among objects, Nature of a Class, Relationship among Classes, Interplay of Classes and Objects, Identifying Classes and Objects, Importance of Proper Classification, Identifying Classes and Objects, Key abstractions and Mechanisms.

**Unit-III**

**Introduction to UML:** Why model, Conceptual model of UML, Architecture, Classes, Relationships, Common Mechanisms, Class diagrams, Object diagrams.

**Unit-IV**

**Structural Modeling:** Package Diagram, Composite Structure Diagram, Component Diagram, Deployment Diagram, Profile Diagram.

**Unit-V**

**Behavioral Modeling:** Use Case Diagram, Activity Diagrams, State Machine Diagrams, Sequence Diagram, Communication Diagram, Timing Diagram, Interaction Overview Diagram.

**Text Books:**

1. "Object- Oriented Analysis And Design with Applications", Grady BOOCH, Robert A. Maksimchuk, Michael W. ENGLE, Bobbi J. Young, Jim Conallen, Kellia Houston, PEARSON, 3<sup>rd</sup> edition, 2013.
2. "The Unified Modeling Language User Guide", Grady Booch, James Rumbaugh, Ivar Jacobson, PEARSON 12<sup>th</sup> Impression, 2012.
3. <http://www.omg.org/>

**References:**

1. "Object-oriented analysis and design using UML", Mahesh P. Matha, PHI
2. "Head first object-oriented analysis and design", Brett D. McLaughlin, Gary Pollice, Dave West, O'Reilly
3. "Object-oriented analysis and design with the Unified process", John W. Satzinger, Robert B. Jackson, Stephen D. Burd, Cengage Learning
4. "The Unified modeling language Reference manual", James Rumbaugh, Ivar Jacobson, Grady Booch, Addison-Wesley

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<b>15A05504 PRINCIPLES OF PROGRAMMING LANGUAGES</b>				

**Course Objectives:**

- To study various programming paradigms.
- To provide conceptual understanding of High level language design and implementation.
- To introduce the power of scripting languages

**Course Outcomes:**

- Ability to select appropriate programming language for problem solving
- Ability to design new programming language.

**Unit I:**

**Introduction:** Software Development Process, Language and Software Development Environments, Language and Software Design Models, Language and Computer Architecture, Programming Language Qualities, A brief Historical Perspective.

**Syntax and Semantics:** Language Definition, Language Processing, Variables, Routines, Aliasing and Overloading, Run-time Structure.

**Unit II:**

**Structuring the data:** Built-in types and primitive types, Data aggregates and type constructors, User-defined types and abstract data types, Type Systems, The type Structure of representative languages, Implementation Models

**Unit III:**

**Structuring the Computation:** Expressions and Statements, Conditional Execution and Iteration, Routines, Exceptions, Pattern Matching, Nondeterminism and Backtracking, Event-driven computations, Concurrent Computations

**Structuring the Program:** Software Design Methods, Concepts in Support of Modularity, Language Features for Programming in the Large, Generic Units

**Unit IV:**

**Object-Oriented Languages:** Concepts of Object-oriented Programming, Inheritances and the type system, Object-oriented features in programming languages

**Unit V:**

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**Functional Programming Languages:** Characteristics of imperative languages, Mathematical and programming functions, Principles of Functional Programming, Representative Functional Languages, Functional Programming in C++

**Logic and Rule-based Languages:** “What” versus “how”: Specification versus implementation, Principles of Logic Programming, PROLOG, Functional Programming versus Logic Programming, Rule-based Languages

**Textbook:**

- 1) “Programming Language Concepts”, Carlo Ghezzi, Mehdi Jazayeri, WILEY Publications. Third Edition, 2014

**Reference Textbooks:**

1. Concepts of Programming Languages, Tenth Edition, Robert W. Sebesta, Pearson Education.
2. Programming Languages Principles and Paradigms, Second Edition, Allen B. Tucker, Robert E. Noonan, McGraw Hill Education.
3. Introduction to Programming Languages, Aravind Kumar Bansal, CRC Press.

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**15A05505****SOFTWARE TESTING****Course Objectives:**

- Fundamentals for various testing methodologies.
- Describe the principles and procedures for designing test cases.
- Provide supports to debugging methods.
- Acts as the reference for software testing techniques and strategies.

**Course Outcomes:**

- Understand the basic testing procedures.
- Able to support in generating test cases and test suites.
- Able to test the applications manually by applying different testing methods and automation tools.
- Apply tools to resolve the problems in Real time environment.

**UNIT I**

**Introduction:** Purpose of Testing, Dichotomies, Model for Testing, Consequences of Bugs, Taxonomy of Bugs.

**Flow graphs and Path testing:** Basics Concepts of Path Testing, Predicates, Path Predicates and Achievable Paths, Path Sensitizing, Path Instrumentation, Application of Path Testing.

**UNIT II**

**Transaction Flow Testing:** Transaction Flows, Transaction Flow Testing Techniques.

**Dataflow testing:** Basics of Dataflow Testing, Strategies in Dataflow Testing, Application of Dataflow Testing.

**UNIT III**

**Domain Testing:** Domains and Paths, Nice & Ugly Domains, Domain testing, Domains and Interfaces Testing, Domain and Interface Testing, Domains and Testability.

**UNIT IV**

**Paths, Path products and Regular expressions:** Path Products & Path Expression, Reduction Procedure, Applications, Regular Expressions & Flow Anomaly Detection.

**Logic Based Testing:** Overview, Decision Tables, Path Expressions, KV Charts, Specifications.

**UNIT V:**

**State, State Graphs and Transition Testing:** State Graphs, Good & Bad State Graphs, State Testing, Testability Tips.

**Graph Matrices and Application:** Motivational Overview, Matrix of Graph, Relations, Power of a Matrix, Node Reduction Algorithm, Building Tools.

**Text Books:**

1. Software testing techniques – Boris Beizer, Dreamtech, second edition.

**Reference Books :**

1. The craft of software testing - Brian Marick, Pearson Education.
2. Software Testing- Yogesh Singh, Camebridge
3. Software Testing, 3<sup>rd</sup> edition, P.C. Jorgensen, Aurbach Publications (Dist.by SPD).
4. Software Testing, N.Chauhan, Oxford University Press.
5. Introduction to Software Testing, P.Ammann & J.Offutt, Cambridge Univ. Press.
6. Effective methods of Software Testing, Perry, John Wiley, 2<sup>nd</sup> Edition, 1999.
7. Software Testing Concepts and Tools, P.Nageswara Rao, dreamtech Press
8. Win Runner in simple steps by Hakeem Shittu,2007 Genixpress.
9. Foundations of Software Testing, D.Graham & Others, Cengage Learning.



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**15A05506**
**INTRODUCTION TO BIG DATA  
(MOOCS-I)**
**Course Objectives:**

- To understand Big Data Analytics for different systems like Hadoop.
- To learn the design of Hadoop File System.
- To learn how to analyze Big Data using different tools.
- To understand the importance of Big Data in comparison with traditional databases.

**Course Outcomes:**

- To gain knowledge about working of Hadoop File System.
- Ability to analyze Big Data using different tools.

**Unit-1:** Distributed programming using JAVA: Quick Recap and advanced Java Programming: Generics, Threads, Sockets, Simple client server Programming using JAVA, Difficulties in developing distributed programs for large scale clusters and introduction to cloud computing.

**Unit-2:** Distributed File systems leading to Hadoop file system, introduction, Using HDFS, Hadoop Architecture, Internals of Hadoop File Systems.

**Unit-3:** Map-Reduce Programming: Developing Distributed Programs and issues, why map- reduce and conceptual understanding of Map-Reduce programming, Developing Map-Reduce programs in Java, setting up the cluster with HDFS and understanding how Map- Reduce works on HDFS, Running simple word count Map-Reduce program on the cluster, Additional examples of M-R Programming.

**Unit-4:** Anatomy of Map-Reduce Jobs: Understanding how Map- Reduce program works, tuning Map-Reduce jobs, Understanding different logs produced by Map-Reduce jobs and debugging the Map- Reduce jobs.

**Unit-5:** Case studies of Big Data analytics using Map-Reduce programming: K-Means clustering, using Big Data analytics libraries using Mahout.

**Text Books:**

1. JAVA in a Nutshell 4th Edition.
2. Hadoop: The definitive Guide by Tom White, 3rd Edition, O'reily.

**References:**

1. Hadoop in Action by Chuck Lam, Manning Publications.

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<b>15A05507</b>	<b>3</b>	<b>1</b>	<b>0</b>	<b>3</b>
<b>R-PROGRAMMING</b>				
<b>(MOOCS-I)</b>				

**Course Objectives:**

- Understand the fundamentals of 'R' programming
- Learn how to carry out a range of commonly used statistical methods including analysis of variance and linear regression.
- Explore data-sets to create testable hypotheses and identify appropriate statistical tests.

**Course Outcomes:**

- Ability to Work on a real life Project, implementing R Analytics to create Business Insights.
- Ability to analyze the data and results using R, a flexible and completely cross- platform.
- Ability to use a wide range of analytical methods and produce presentation quality graphics.

**UNIT-I**

**INTRODUCING R:** Getting the Hand of R, Running the R Program, Finding Your Way with R, Command Packages.

**BECOMING FAMILIAR WITH R:** Reading and Getting Data into R, Viewing Named Objects, Types of Data Items, The Structure of Data Items, Examining Data Structure Working with History Commands, Saving your Work in R.

**WORKING WITH OBJECTS:** Manipulating Objects, Viewing Objects within Objects, Constructing Data Objects, Forms of Data Objects: Testing and Converting,

**UNIT II**

**Data:** Descriptive statistics and tabulation.

**DISTRIBUTION:** Looking at the Distribution of Data

**SIMPLE HYPOTHESIS TESTING:** Using the Student's t-test, The Wilcoxon U-Test (Mann-Whitney), Paired t- and U-Tests, Correlation and Covariance, Tests for Association.

**UNIT-III**

**INTRODUCTION TO GRAPHICAL ANALYSIS:** Box-whisker Plots, Scatter Plots, Pairs Plots(Multiple Correlation Plots) Line Charts, Pie Charts, Cleveland Dot Charts, Bar Charts, Copy Graphics to Other Applications.

**FORMULA NOTATION AND COMPLEX STATISTICS:** Examples of Using Formula Syntax for Basic tests, Formula Notation in Graphics, Analysis of Variance (ANOVA).

**UNIT-IV**

**MANIPULATING DATA AND EXTRACTING COMPONENTS:** Creating Data for Complex Analysis, Summarizing Data.

**REGRESSION (LINEAR MODELING):** Simple Linear Regression, Multiple Regression, Curvilinear Regression, Plotting Linear Models and Curve Fitting, Summarizing Regression Models.

**UNIT-V**

Adding elements to existing plots, Matrix plots, multiple plots in one window, exporting graphs

**WRITING YOUR OWN SCRIPTS:**

**BEGINNING TO PROGRAM:** Copy and Paste Scripts, Creating Simple Functions, Making Source Code.

**Text Books:**

- 1) "Beginning R the statistical programming language" Dr. Mark Gardener, Wiley Publications, 2015.

**References Books:**

- 1) Hands-On Programming with R Paperback by Grolemund (Author), Garrett (Author), SPD, 2014.
- 2) The R Book, Michael J. Crawley, WILEY, 2012.

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**15A05508 INTRODUCTION TO OPERATIONS MANAGEMENT  
(MOOCS-I)****Course Objectives:**

Study key aspects of business operations and lean management including capacity, productivity, quality, and supply chain.

**Course Outcomes:**

- Identify an operations system with some known standard configurations
- Make an assessment of the complexity of an operations system
- Understand the various components of a supply chain and the need to configure them appropriately
- Identify methods for reducing bullwhip effect in supply chains
- Understand and relate the concept of Lean Management to one's own business situation
- Understand & use specific tools and techniques to analyze quality problems

**UNIT I****Understanding Operations**

Introduction, Operations in an Organization, Alternative Configurations in Operations, Performance Measures in Operations.

**UNIT II****Analyzing Capacity in Operations**

Introduction, The Notion of Capacity in Organizations, Process Design and Capacity Analysis, Capacity Estimation and De-bottlenecking, Other Issues in Capacity Planning.

**UNIT III****Supply Chain in Operations**

Introduction, Supply Chain Management: Components, Design of an Appropriate Supply Chain, Issues in Inventory Planning, Reverse Supply Chain.

**UNIT IV****Productivity Improvement in Operations**

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Introduction, Productivity Paradox in Organizations, Productivity Management: Philosophy, Tools & Techniques, Tools for Sustaining Productivity Improvements, Challenges in Lean Management.

**UNIT V****Assuring Quality in Operations**

Introduction, Six Sigma Quality in Organizations, Total Quality Management: Philosophy, Tools & Techniques, Statistical Process Control, Establishing Quality in Service Organizations.

**Text Book:**

1. B. Mahadevan, "Operations Management: Theory & Practice", third edition, Pearson education-2015.

**Reference Books:**

1. Nigel Slack, Stuart Chambers and Robert Johnston, "Operations Management", Sixth Edition, Pearson-2010.
2. [Robert Johnston](#), [Graham Clark](#) and [Michael Shulver](#), "Service Operations Management", 4th Edition, Pearson.
3. S. N. Chary, "Production And Operations Management", Third edition, [Tata McGraw-Hill Education-2004](#)

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<b>15A05509</b>	<b>OBJECT ORIENTED ANALYSIS AND DESIGN &amp; SOFTWARE TESTING LABORATORY</b>			

**Course Objectives:**

- Practice the notation for representing various UML diagrams
- Analyze and design the problem by representing using UML diagrams
- Become familiar with all phases of OOAD

**Course Outcomes:**

- Find solutions to the problems using object oriented approach
- Represent using UML notation and interact with the customer to refine the UML diagrams

**Part A: OOAD Lab**

UML diagrams to be developed are:

1. Use Case Diagram.
2. Class Diagram.
3. Sequence Diagram.
4. Collaboration Diagram.
5. State Diagram
6. Activity Diagram.
7. Component Diagram
8. Deployment Diagram.
9. Test Design.

Problems that may be considered are

1. College information system
2. Hostel management
3. ATM system

**Part B : Software Testing Lab**

- 1 Write programs in 'C' Language to demonstrate the working of the following constructs:
  - i) do...while
  - ii) while....do
  - iii) if...else
  - iv) switch
  - v) for

- 2 "A program written in 'C' language for Matrix Multiplication fails" Introspect the causes for its failure and write down the possible reasons for its failure.
- 3 Take any system (e.g. ATM system) and study its system specifications and report the various bugs.
- 4 Write the test cases for any known application (e.g. Banking application)
- 5 Create a test plan document for any application (e.g. Library Management System)
- 6 Study of Win Runner Testing Tool and its implementation
  - a) Win runner Testing Process and Win runner User Interface.
  - b) How Win Runner identifies GUI (Graphical User Interface) objects in an application and describes the two modes for organizing GUI map files.
  - c) How to record a test script and explains the basics of Test Script Language (TSL).
  - d) How to synchronize a test when the application responds slowly.
  - e) How to create a test that checks GUI objects and compare the behaviour of GUI objects in different versions of the sample application.
  - f) How to create and run a test that checks bitmaps in your application and run the test on different versions of the sample application and examine any differences, pixel by pixel.
  - g) How to Create Data-Driven Tests which supports to run a single test on several sets of data from a data table.
  - h) How to read and check text found in GUI objects and bitmaps.
  - i) How to create a batch test that automatically runs the tests.
  - j) How to update the GUI object descriptions which in turn supports test scripts as the application changes.

Apply Win Runner testing tool implementation in any real time applications.



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**15A05510 OPERATING SYSTEMS LABORATORY****Course Objectives:**

- To understand the design aspects of operating system
- To solve various synchronization problems

**Course out comes:**

- Ensure the development of applied skills in operating systems related areas.
- Able to write software routines modules or implementing various concepts of operating system.

1. Simulate the following CPU scheduling algorithms
  - a) Round Robin b) SJF c) FCFS d) Priority
2. Simulate all file allocation strategies
  - a) Sequential b) Indexed c) Linked
3. Simulate MVT and MFT
4. Simulate all File Organization Techniques
  - a) Single level directory b) Two level c) Hierarchical d) DAG
5. Simulate Bankers Algorithm for Dead Lock Avoidance
6. Simulate Bankers Algorithm for Dead Lock Prevention
7. Simulate all page replacement algorithms
  - a) FIFO b) LRU c) LFU Etc. ...
8. Simulate Paging Technique of memory management
9. Control the number of ports opened by the operating system with
  - a) Semaphore b) monitors
10. Simulate how parent and child processes use shared memory and address space
11. Simulate sleeping barber problem
12. Simulate dining philosopher's problem
13. Simulate producer and consumer problem using threads (use java)
14. Simulate little's formula to predict next burst time of a process for SJF scheduling algorithm.
15. Develop a code to detect a cycle in wait-for graph
16. Develop a code to convert virtual address to physical address
17. Simulate how operating system allocates frame to process
18. Simulate the prediction of deadlock in operating system when all the processes announce their resource requirement in advance.

**Reference Books :**

1. "Operating System Concepts", Abraham Silberchatz, Peter B. Galvin, Greg Gagne, Eighth edition, John Wiley.
2. "Operating Systems: Internals and Design Principles", Stallings, Sixth Edition– 2009, Pearson Education
3. "Modern Operating Systems", Andrew S Tanenbaum, Second Edition, PHI.
4. "Operating Systems", S.Haldar, A.A.Aravind, Pearson Education.
5. "Principles of Operating Systems", B.L.Stuart, Cengage learning, India Edition.2013-2014
6. "Operating Systems", A.S.Godbole, Second Edition, TMH.
7. "An Introduction to Operating Systems", P.C.P. Bhatt, PHI.

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**15A99501 SOCIAL VALUES & ETHICS (AUDIT COURSE)**

*(Common to all Branches)*

**UNIT - I**

**Introduction and Basic Concepts of Society: Family and Society:** Concept of family, community, PRIs and other community based organizations and society, growing up in the family – dynamics and impact, Human values, Gender Justice.

**Channels of Youth Moments for National Building: NSS & NCC:** History, philosophy, aims & objectives; Emblems, flags, mottos, songs, badge etc.; Organizational structure, roles and responsibilities of various NSS functionaries. **Nehru Yuva Kendra (NYK):** Activities – Socio Cultural and Sports.

**UNIT – II**

Activities of NSS, NCC, NYK:

**Citizenship:** Basic Features Constitution of India, Fundamental Rights and Fundamental Duties, Human Rights, Consumer awareness and the legal rights of the consumer, RTI.

**Youth and Crime:** Sociological and psychological Factors influencing youth crime, Peer Mentoring in preventing crimes, Awareness about Anti-Ragging, Cyber Crime and its prevention, Juvenile Justice

**Social Harmony and National Integration:** Indian history and culture, Role of youth in peace-building and conflict resolution, Role of youth in Nation building.

**UNIT – III**

**Environment Issues:** Environment conservation, enrichment and Sustainability, Climate change, Waste management, Natural resource management (Rain water harvesting, energy conservation, waste land development, soil conservations and afforestation).

**Health, Hygiene & Sanitation:** Definition, needs and scope of health education, Food and Nutrition, Safe drinking water, Sanitation, Swachh Bharat Abhiyan.

**Disaster Management:** Introduction to Disaster Management, classification of disasters, Role of youth in Disaster Management. Home Nursing, First Aid.

**Civil/ Self Defense:** Civil defense services, aims and objectives of civil defense, Need for self defense training – Teakwondo, Judo, karate etc.,

**UNIT – IV**

**Gender Sensitization:** Understanding Gender – Gender inequality – Role of Family, Society and State; Challenges – Declining Sex Ratio – Sexual Harassment – Domestic Violence; Gender Equality – Initiatives of Government – Schemes, Law; Initiates of NGOs – Awareness, Movements;

**UNIT - V**

**Physical Education :** Games & Sports: Health and Recreation – Biological basis of Physical activity – benefits of exercise – Physical, Psychological, Social; Physiology of Muscular Activity, Respiration, Blood Circulation.

**Yoga:** Basics of Yoga – Yoga Protocol, Postures, Asanas, Pranayama: Introduction of Kriyas, Bandhas and Mudras.

**TEXT BOOKS:**

1. NSS MANUAL
2. SOCIETY AND ENVIRONMENT: A.S.Chauha, Jain Brothers Publications, 6<sup>th</sup> Edition, 2006
3. INDIAN SOCIAL PROBLEM: G.R.Madan, Asian Publisher House
4. INDIAN SOCIAL PROBLEM: Ram Ahuja, Rawat Publications
5. HUMAN SOCIETY: Kingsley Davis, Macmillan
6. SOCIETY: Mac Iver D Page, Macmillan
7. SOCIOLOGY – THEMES AND PERSPECTIVES: Michael Honalambos, Oxford University Press
8. CONSTITUTION OF INDIA: D.D.Basu, Lexis Nexis Butterworth Publishers
9. National Youth Policy 2014 (available on [www.yas.nic.in](http://www.yas.nic.in))
10. TOWARDS A WORLD OF EQUALS: A.Suneetha, Uma Bhrugudanda, Duggirala Vasantha, Rama Melkote, Vasudha Nagraj, Asma Rasheed, Gogu Shyamala, Deepa Streenivas and Susie Tharu
11. LIGHT ON YOGA : B.K.S.Iyengar, Penguin Random House Publishers

[www.un.org](http://www.un.org)

[www.india.gov.in](http://www.india.gov.in)

[www.yas.nic.in](http://www.yas.nic.in)

<http://www.who.int/countries/ind/en/>

<http://www.ndma.gov.in>

<http://ayush.gov.in/event/common-yoga-protocol-2016-0>

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR**

<b>B. Tech III-II Sem. (CSE)</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	<b>3</b>	<b>1</b>	<b>0</b>	<b>3</b>

**15A05601 COMPILER DESIGN****Course Objectives:**

This course is a *de facto* capstone course in Computer Science, as it combines skills in software design, programming, data structures and algorithms, theory of computing, documentation, and machine architecture to produce a functional compiler.

- Realize that computing science theory can be used as the basis for real applications
- Introduce the major concept areas of language translation and compiler design.
- Learn how a compiler works
- Know about the powerful compiler generation tools and techniques, which are useful to the other non-compiler applications
- Know the importance of optimization and learn how to write programs that execute faster

**Course Outcomes**

- Able to design a compiler for a simple programming language
- Able to use the tools related to compiler design effectively and efficiently
- Ability to write optimized code

**Unit - I**

**Introduction:** Language processors, The Structure of a Compiler, the science of building a compiler

**Lexical Analysis:** The Role of the lexical analyzer, Input buffering, Specification of tokens, Recognition of tokens, The lexical analyzer generator Lex, Design of a Lexical Analyzer generator

**Unit II**

**Syntax Analysis:** Introduction, Context Free Grammars, Writing a grammar, TOP Down Parsing, Bottom Up Parsing, Introduction to LR Parsing: Simple LR, More Powerful LR Parsers, Using ambiguous grammars, Parser Generators

**UNIT III**

**Syntax Directed Translation:** Syntax Directed Definitions, Evaluation orders for SDD's, Application of SDT, SDT schemes, Implementing L-attribute SDD's.

**Intermediate Code Generation:** Variants of syntax trees, three address code, Types and declarations, Translations of expressions, Type checking, control flow statements, backpatching, switch statements, intermediate code for procedure.

#### **UNIT IV**

**Run Time Environment :** storage organization, , Stack allocation of space, Access to non-local data on stack , Heap management

**Symbol Table:** Introduction, symbol table entries, operations on the symbol table, symbol table organizations, non block structured language, block structured language.

#### **UNIT V**

**Code Generation:** Issues in the design of a code generator, The Target language, Basic blocks and flow graphs, optimization of basic blocks, a simple code generator, register allocation and assignment, optimal code generation for expressions, dynamic programming code generation.

**Code Optimization:** Introduction, where and how to optimize, principle source of optimization, function preserving transformations, loop optimizations, global flow analysis, machine dependent optimization

#### **Text Books :**

1. "Compilers Principles, Techniques and Tools", Second Edition, Alfred V. Aho, Monica S. Lam, Ravi Sethi, Jeffrey D. Ullman., Pearson,2014.
2. "Compiler Construction", K.V.N Sunitha, Pearson, 2013

#### **Reference Books :**

1. "Compiler Design", K. Muneeswaran., Oxford University Press, 2012
2. "Engineering A Compiler", Second Edition, Keith D. Cooper & Linda Torczon., MK(Morgan Kaufmann) (ELSEVIER)
3. "Compilers Principles and Practice", Parag H. Dave, Himanshu B. Dave.,PEARSON
4. "Compiler Design", SandeepSaxena, Rajkumar Singh Rathore., S.Chand publications
5. "Compiler Design", SantanuChattopadhyay., PHI
6. "Principals of Compiler Design", Nadhni Prasad, Elsevier

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**15A05602 DATA WAREHOUSING & MINING****Course Objectives:**

- To know the basic concepts and principles of data warehousing and data mining
- Learn pre-processing techniques and data mining functionalities
- Learn and create multidimensional models for data warehousing
- Study and evaluate performance of Frequent Item sets and Association Rules
- Understand and Compare different types of classification and clustering algorithms

**Course Outcomes:**

- Understand the basic concepts of data warehouse and data Mining
- Apply pre-processing techniques for data cleansing
- Analyze and evaluate performance of algorithms for Association Rules
- Analyze Classification and Clustering algorithms

**UNIT I**

Introduction: Fundamentals of data mining, Data Mining Functionalities, Classification of Data Mining systems, Data Mining Task Primitives, Integration of a Data Mining System with a Database or a Data Warehouse System, Major issues in Data Mining. Data Preprocessing: Need for Preprocessing the Data, Data Cleaning, Data Integration and Transformation, Data Reduction, Discretization and Concept Hierarchy Generation.

**UNIT II**

Data Warehouse and OLAP Technology for Data Mining: Data Warehouse, Multidimensional Data Model, Data Warehouse Architecture, Data Warehouse Implementation, Further Development of Data Cube Technology, From Data Warehousing to Data Mining. Data Cube Computation and Data Generalization: Efficient Methods for Data Cube Computation, Further Development of Data Cube and OLAP Technology, Attribute-Oriented Induction.

**UNIT III**

Mining Frequent Patterns, Associations and Correlations: Basic Concepts, Efficient and Scalable Frequent Itemset Mining Methods, Mining various kinds of Association Rules,

From Association Mining to Correlation Analysis, Constraint-Based Association Mining, Classification and Prediction: Issues Regarding Classification and Prediction, Classification by Decision Tree Induction, Bayesian Classification, Rule-Based Classification, Classification by Back propagation, Support Vector Machines, Associative Classification, Lazy Learners, Other Classification Methods, Prediction, Accuracy and Error measures, Evaluating the accuracy of a Classifier or a Predictor, Ensemble Methods

**UNIT IV**

Cluster Analysis Introduction :Types of Data in Cluster Analysis, A Categorization of Major Clustering Methods, Partitioning Methods, Hierarchical Methods, Density-Based Methods, Grid-Based Methods, Model-Based Clustering Methods, Clustering High-Dimensional Data, Constraint-Based Cluster Analysis, Outlier Analysis.

**UNIT V**

Mining Streams, Time Series and Sequence Data: Mining Data Streams, Mining Time-Series Data, Mining Sequence Patterns in Transactional Databases, Mining Sequence Patterns in Biological Data, Graph Mining, Social Network Analysis and Multi relational Data Mining, Mining Object, Spatial, Multimedia, Text and Web Data: Multidimensional Analysis and Descriptive Mining of Complex Data Objects, Spatial Data Mining, Multimedia Data Mining, Text Mining, Mining the World Wide Web.

**TEXT BOOKS:**

1. Data Mining: Concepts and Techniques, Jiawei Han and Micheline Kamber, Morgan Kaufmann Publishers, Elsevier, Second Edition, 2006.
2. Introduction to Data Mining – Pang-Ning Tan, Michael Steinbach and Vipin Kumar, Pearson Education.

**REFERENCES:**

1. Data Mining Techniques, Arun KPujari, Second Edition, Universities Press.
2. Data Warehousing in the Real World, Sam Aanhory& Dennis Murray Pearson EdnAsia.
3. Insight into Data Mining, K.P.Soman, S.Diwakar,V.Ajay, PHI,2008.



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	<b>3</b>	<b>1</b>	<b>0</b>	<b>3</b>

**15A05603 DESIGN PATTERNS****Course Objectives:**

- To understand design patterns and their underlying object oriented concepts.
- To understand implementation of design patterns and providing solutions to real world software design problems.
- To understand patterns with each other and understanding the consequences of combining patterns on the overall quality of a system.

**Course Outcomes:**

- Know the underlying object oriented principles of design patterns.
- Understand the context in which the pattern can be applied.
- Understand how the application of a pattern affects the system quality and its tradeoffs.

**UNIT-I****Introduction to Design Patterns**

Design Pattern Definition, Design Patterns in Small Talk MVC, Describing Design Patterns, Catalog of Design Patterns, Organizing the Catalog, Solving of Design Problems using Design Patterns, Selection of a Design Pattern, Use of Design Patterns.

**UNIT-II****Designing A Document Editor: A Case Study**

Design problems, Document structure, Formatting, Embellishing the User Interface, Supporting Multiple Look and Feel standards, Supporting Multiple Window Systems, User Operations, Spelling Checking and Hyphenation.

Creational Patterns: Abstract Factory, Builder, Factory Method, Prototype, Singleton, Discussion of Creational Patterns.

**UNIT-III**

**Structural Patterns-1:** Adapter, Bridge, Composite.

**Structural Patterns-2:** Decorator, Façade, Flyweight, Proxy, Discuss of Structural Patterns.

**UNIT-IV**

**Behavioral Patterns-1:** Chain of Responsibility, Command, Interpreter, Iterator.

**Behavioral Patterns-2:** Mediator, Memento, Observer.

**UNIT-V**

Behavioral Patterns-2(cont'd): State, Strategy, Template Method, Visitor, Discussion of Behavioral Patterns.

What to Expect from Design Patterns, A Brief History, The Pattern Community An Invitation, A Parting Thought.

**TEXT BOOK :**

1. Design Patterns By Erich Gamma, Pearson Education

**REFERENCE BOOKS:**

1. Pattern's in JAVA Vol-I By Mark Grand, Wiley DreamTech.
2. Pattern's in JAVA Vol-II By Mark Grand, Wiley DreamTech.
3. JAVA Enterprise Design Patterns Vol-III By Mark Grand, Wiley DreamTech.
4. Head First Design Patterns By Eric Freeman-Oreilly-spd
5. Design Patterns Explained By Alan Shalloway, Pearson Education.
6. Pattern Oriented Software Architecture, F.Buschmann & others, John Wiley & Sons.

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**15A05604 DESIGN AND ANALYSIS OF ALGORITHMS**
**Course Objectives:**

- To know the importance of the complexity of a given algorithm.
- To study various algorithm design techniques.
- To utilize data structures and/or algorithmic design techniques in solving new problems.
- To know and understand basic computability concepts and the complexity classes P, NP, and NP-Complete.
- To study some techniques for solving hard problems.

**Course Outcomes:**

- Analyze the complexity of the algorithms
- Use techniques divide and conquer, greedy, dynamic programming, backtracking, branch and bound to solve the problems.
- Identify and analyze criteria and specifications appropriate to new problems, and choose the appropriate algorithmic design technique for their solution.
- Able to prove that a certain problem is NP-Complete.

**UNIT I**

**Introduction:** What is an Algorithm, Algorithm specification, Performance analysis.

**Divide and Conquer:** General method, Binary Search, Finding the maximum and minimum, Merge sort, Quick Sort, Selection sort, Strassen's matrix multiplication.

**UNIT II**

**Greedy Method:** General method, Knapsack problem, Job Scheduling with Deadlines, Minimum cost Spanning Trees, Optimal storage on tapes, Single-source shortest paths.

**Dynamic programming:** General Method, Multistage graphs, All-pairs shortest paths, Optimal binary search trees, 0/1 knapsack, The traveling sales person problem.

**UNIT III**

**Basic Traversal and Search Techniques:** Techniques for binary trees, Techniques for Graphs,

Connected components and Spanning trees, Bi-connected components and DFS

**Back tracking:** General Method, 8 – queens problem, Sum of subsets problem, Graph coloring and Hamiltonian cycles, Knapsack Problem.

**UNIT IV**

**Branch and Bound:** The method, Travelling salesperson, 0/1 Knapsack problem, Efficiency

Considerations.

**Lower Bound Theory:** Comparison trees, Lower bounds through reductions – Multiplying triangular matrices, inverting a lower triangular matrix, computing the transitive closure.

**UNIT V**

**NP – Hard and NP – Complete Problems:** NP Hardness, NP Completeness, Consequences of being in P, Cook's Theorem, Reduction Source Problems, Reductions: Reductions for some known problems

**Text Books:**

1. "Fundamentals of Computer Algorithms", Ellis Horowitz, S. Satraj Sahani and Rajasekhran, 2nd edition, University Press.2014,
2. "Design and Analysis of Algorithms", Parag Himanshu Dave, Himanshu Bhalchandra Dave, Pearson Education, Second Edition, 2009.

**Reference Books:**

1. "Introduction to Algorithms", second edition, T.H.Cormen, C.E.Leiserson, R.L.Rivest and C.Stein, PHI Pvt. Ltd./ Pearson Education.
2. "Introduction to Design and Analysis of Algorithms A strategic approach", R.C.T.Lee, S.S.Tseng, R.C.Chang and T.Tsai, Mc Graw Hill.
3. "Data structures and Algorithm Analysis in C++", Allen Weiss, Second edition, Pearson education.
4. "Design and Analysis of algorithms", Aho, Ullman and Hopcroft, Pearson education.
5. "Algorithms" – Richard Johnson baugh and Marcus Schaefer, Pearson Education

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**15A05605 WEB AND INTERNET TECHNOLOGIES**
**Course Objectives:**

- To introduce client side scripting with Javascript and DHTML
- To introduce server side programming with Java servlets, JSP and PHP.
- To learn the basic web concepts and Internet protocols

**Course Outcomes:**

- Ability to create dynamic and interactive web sites
- Gain knowledge of client side scripting using java sript and DHTML.
- Demonstrate understanding of what is XML and how to parse and use XML data
- Able to do server side programming with Java Servelets, JSP and PHP.
- Able to design rich client presentation using AJAX.

**UNIT I**

Introduction to Web Technologies: Introduction to Web servers like Apache 1.1, IIS XAMPP(Bundle Server), WAMP(Bundle Server), Handling HTTP Request and Response, installations of above servers, HTML and CSS: HTML 5.0 , XHTML, CSS 3.

**UNIT II**

**Java Script:** An introduction to JavaScript–JavaScript DOM Model-Date and Objects,- Regular Expressions- Exception Handling-Validation-Built-in objects-Event Handling-DHTML with JavaScript. **Servlets:** Java Servlet Architecture- Servlet Life Cycle- Form GET and POST actions- Session Handling- Understanding Cookies.

**Installing and Configuring Apache Tomcat Web Server:-** DATABASE CONNECTIVITY: JDBC perspectives, JDBC program example - **JSP:** Understanding Java Server Pages-JSP Standard Tag Library(JSTL)-Creating HTML forms by embedding JSP code.

**UNIT III**

Introduction to PHP: The problem with other Technologies (Servelets and JSP), Downloading, installing, configuring PHP, Programming in a Web environment and The anatomy of a PHP Page.

Overview of PHP Data types and Concepts: Variables and data types, Operators, Expressions and Statements, Strings, Arrays and Functions.

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PHP Advanced Concepts: Using Cookies, Using HTTP Headers, Using Sessions, Authenticating users, Using Environment and Configuration variables, Working with Date and Time.

#### **UNIT IV**

Creating and Using Forms: Understanding Common Form Issues, GET vs. POST, Validating form input, Working with multiple forms, and Preventing Multiple Submissions of a form.

XML: Basic XML- Document Type Definition XML Schema DOM and Presenting XML, XML Parsers and Validation, XSL and XSLT Transformation, News Feed (RSS and ATOM).

#### **UNIT V**

AJAX: Ajax Client Server Architecture-XML Http Request Object-Call Back Methods; Web Services: Introduction- Java web services Basics – Creating, Publishing, Testing and Describing a Web services (WSDL)-Consuming a web service, Database Driven web service from an application – SOAP.

#### **TEXT BOOKS:**

1. Beginning PHP and MySQL, 3<sup>rd</sup> Edition , Jason Gilmore, Apress Publications (Dream tech.).
2. PHP 5 Recipes A problem Solution Approach Lee Babin, Nathan A Good, Frank M.Kromann and Jon Stephens.
3. Deitel and Deitel and Nieto, "Internet and World Wide Web - How to Program", Prentice Hall, 5 th Edition, 2011.
4. Herbert Schildt, "Java-The Complete Reference", Eighth Edition, Mc Graw Hill Professional, 2011.

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	<b>3</b>	<b>1</b>	<b>0</b>	<b>3</b>

**15A05606      ARTIFICIAL INTELLIGENCE  
(CBCC-I)**

**Course Objectives:**

To learn the basics of designing intelligent agents that can solve general purpose problems, represent and process knowledge, plan and act, reason under uncertainty and can learn from experiences.

**Course Outcomes:**

- Select a search algorithm for a problem and estimate its time and space complexities.
- Possess the skill for representing knowledge using the appropriate technique for a given problem
- Possess the ability to apply AI techniques to solve problems of game playing, expert systems, machine learning and natural language processing.

**UNIT I****PROBLEM SOLVING**

Introduction – Agents – Problem formulation – uninformed search strategies – heuristics – informed search strategies – constraint satisfaction

**UNIT II****LOGICAL REASONING**

Logical agents – propositional logic – inferences – first-order logic – inferences in firstorder logic – forward chaining – backward chaining – unification – resolution

**UNIT III****PLANNING**

Planning with state-space search – partial-order planning – planning graphs – planning and acting in the real world

**UNIT IV****UNCERTAIN KNOWLEDGE AND REASONING**

Uncertainty – review of probability - probabilistic Reasoning – Bayesian networks – inferences in Bayesian networks – Temporal models – Hidden Markov models.

**UNIT V  
LEARNING**

Learning from observation - Inductive learning – Decision trees – Explanation based learning –Statistical Learning methods - Reinforcement Learning

**TEXT BOOK:**

1. S. Russel and P. Norvig, "Artificial Intelligence – A Modern Approach", Second Edition, Pearson Education, 2003.

**REFERENCES:**

1. David Poole, Alan Mackworth, Randy Goebel, "Computational Intelligence : a logical approach", Oxford University Press, 2004.
2. G. Luger, "Artificial Intelligence: Structures and Strategies for complex problem solving", Fourth Edition, Pearson Education, 2002.
3. J. Nilsson, "Artificial Intelligence: A new Synthesis", Elsevier Publishers, 1998.



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	<b>3</b>	<b>1</b>	<b>0</b>	<b>3</b>

**15A05607 LINUX ENVIRONMENT SYSTEM  
(CBCC-I)****Course Objectives:****The student should be made to:**

- Understand the Multiuser, Multiprocessing, Multitasking, and multiprogramming environment.
- Learn the various flavors and installation types of Linux operating system.
- Experiences the installation and configuration status of Linux system.
- Learn the file system and various commands of Linux environment system.

**Course Outcomes:**

- Able to describe and use the LINUX operating system.
- Able to describe and use the fundamental LINUX system tools and utilities.
- Able to describe and write shell scripts in order to perform basic shell programming.
- Able to describe and understand the LINUX file system.

**UNIT-I**

**INTRODUCTION TO LINUX OPERATING SYSTEM:** Introduction and Types of Operating Systems, Linux Operating System, Features, Architecture Of Linux OS and Shell Interface, Linux System Calls, Linux Shared Memory Management, Device and Disk Management in Linux, Swap space and its management. File System and Directory Structure in Linux. Multi-Processing, load sharing and Multi-Threading in Linux, Types of Users in Linux, Capabilities of Super Users and equivalents.

**UNIT-II**

**INSTALLING LINUX AS A SERVER :** Linux and Linux Distributions ; Major differences between various Operating Systems (on the basis of: Single Users vs Multiusers vs Network Users; Separation of the GUI and the Kernel; Domains; Active Directory;).

**INSTALLING LINUX IN A SERVER CONFIGUARTION :** Before Installation; Hardware; Server Design ;Dual-Booting Issues; Modes of Installation; Installing Fedora Linux; Creating a Boot Disk; Starting the Installation; GNOME AND KDE

: The History of X Windows; The Downside; Enter GNOME; About GNOME ; Starting X Windows and GNOME; GNOME Basics; The GNOME Configuration Tool.

### **UNIT-III**

**INSTALLING SOFTWARE** : The Fedora Package Manager; Installing a New Package using dpkg and RPM; Querying a Package; Uninstalling a Package using dpkg and RPM; Compiling Software; Getting and Unpacking the Package; Looking for Documentation; Configuring the Package; Compiling Your Package; Installing the Package, Driver Support for various devices in linux.

**MANAGING USERS:** Home Directories ;Passwords; Shells; Stratup Scripts; Mail; User Databases; The / etc /passwd File; The / etc / shadow File; The / etc /group File; User Management Tools; Command-Line User Management; User LinuxConf to Manipulate Users and Groups; SetUID and SetGID Programs.

### **UNIT IV**

**THE COMMAND LINE** : An Introduction to BASH, KORN, C, A Shell etc. ; BASH commands: Job Control; Environment Variables; Pipes; Redirection; Command-Line Shortcuts; Documentation Tools; The man Command; the text info System; File Listings; Owner ships and permissions; Listing Files; File and Directory Types; Change Ownership; Change Group; Change Mode ; File Management and Manipulation; Process Manipulation; Miscellaneous Tools; Various Editors Available like: Vi and its modes, Pico, Joe and emacs, , Su Command.

**BOOTING AND SHUTTING DOWN:** LILO and GRUB; Configuring LILO; Additional LILO options; Adding a New Kernel to Boot ; Running LILO; The Steps of Booting; Enabling and disabling Services.

### **UNIT-V**

**FILE SYSTEMS:** The Makeup File Systems; Managing File Systems; Adding and Partitioning a Disk; Network File Systems; Quota Management;

**CORE SYSTEM SERVICES:** The init Service; The inetd and xinetd Processes; The syslogd Daemon; The cron Program.

**PRINTING** : The Basic of lpd; Installing LPRng; Configuring /etc/printcap; The /ETC/lpd.perms File; Clients of lpd, Interfacing Printer through Operating System.

### **Text Books:**

1. [Linux Administration : A Beginner's Guide](#) by **Steve Shah** , Wale Soyinka, ISBN 0072262591 (0-07-226259-1), McGraw-Hill Education.
2. [Unix Shell Programming](#), Yashavant P. Kanetkar, BPB Publications, 2003.
3. UNIX Concepts and Applications by Sumitabha Das Tata McGraw-Hill, 2006.

4. Operating System Concepts 8<sup>th</sup> edition, by Galvin Wiley Global Education, 2012.

**References:**

1. Unix operating system, by [Grace Todino](#), [John Strang](#), [Jerry D. Peek](#) Oreily publications 1993.
2. Operating System Concepts 8<sup>th</sup> edition, by Galvin Wiley Global Education, 2012.

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**15A05608 SYSTEM APPLICATIONS & PRODUCT (SAP)  
(CBCC-I)**
**Course Objectives:**

1. Understand the role of enterprise systems in supporting business processes.
2. Identify key integration points between financial accounting and other processes.
3. Understand the role of the credit management process in fulfillment.
4. Analyze the key concepts associated with material planning.

**Course Outcomes:**

1. Adopt and apply an integrated perspective to business processes
2. Effectively use SAP® ERP to execute the key steps in the procurement process.
3. Ability to use SAP ERP to extract meaningful information about the production process.
4. Extract and evaluate meaningful information about the material planning process using the SAP ERP system.

**Unit 1:**

**Introduction to Business Processes:** The Functional Organizational Structure, Business Processes, Global Bike Incorporated (GBI). **Introduction to Enterprise Systems:** Enterprise Systems, Data in an Enterprise System, Reporting. **Introduction to Accounting:** Organizational Data, Master Data, Key Concepts, Processes, Reporting.

**Unit 2:**

**The Procurement Process:** Organizational Data, Master Data, Key Concepts, Process, Reporting.

**Unit 3:**

**The Fulfillment Process:** Organizational Data, Master Data, Process, Credit Management Process, Reporting.

**Unit 4:**

**The Production Process:** Master Data, Process, Reporting. **Inventory and Warehouse Management Processes:** Inventory Management, Organizational Data in warehouse Management, Master Data in Warehouse Management, Processes in Warehouse Management, Reporting.

**Unit 5:**

**The Material Planning Process:** Master Data, Process, Reporting, **Process Integration:** Procurement, Fulfillment, and IWM Processes, Procurement, Fulfillment, Production, and IWM Processes.

**Text Book:**

1. "Integrated Business Processes with ERP systems" Simha R.Magal, Jeffery word, JOHN WILEY & SON S, INC.

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**15A01608 INTELLECTUAL PROPERTY RIGHTS  
(CBCC-I)****Course Objectives:**

*This course introduces the student to the basics of Intellectual Property Rights, Copy Right Laws Trade Marks and Issues related to Patents. The overall idea of the course is to help and encourage the student for startups and innovations.*

**Course Outcomes:**

*On completion of this course, the student will have an understanding of the following:*

- a) Intellectual Property Rights and what they mean*
- b) Trade Marks and Patents and how to register them*
- c) Laws Protecting the Trade Marks and Patents*
- d) Copy Right and laws related to it.*

**UNIT – I**

Introduction To Intellectual Property: Introduction, Types Of Intellectual Property, International Organizations, Agencies And Treaties, Importance Of Intellectual Property Rights.

**UNIT – II**

Trade Marks : Purpose And Function Of Trade Marks, Acquisition Of Trade Mark Rights, Protectable Matter, Selecting And Evaluating Trade Mark, Trade Mark Registration Processes.

**UNIT – III**

Law Of Copy Rights : Fundamental Of Copy Right Law, Originality Of Material, Rights Of Reproduction, Rights To Perform The Work Publicly, Copy Right Ownership Issues, Copy Right Registration, Notice Of Copy Right, International Copy Right Law.

Law Of Patents : Foundation Of Patent Law, Patent Searching Process, Ownership Rights And Transfer

**UNIT – IV**

Trade Secrets : Trade Secrete Law, Determination Of Trade Secrete Status, Liability For Misappropriations Of Trade Secrets, Protection For Submission, Trade Secrete Litigation.

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Unfair Competition : Misappropriation Right Of Publicity, False Advertising.

UNIT – V

New Developments Of Intellectual Property: New Developments In Trade Mark Law ;  
Copy Right Law, Patent Law, Intellectual Property Audits.

International Overview On Intellectual Property, International – Trade Mark Law, Copy  
Right Law, International Patent Law, International Development In Trade Secrets Law.

TEXT BOOKS & REFERENCES:

1. Intellectual Property Rights, Deborah. E. Bouchoux, Cengage Learning.
2. Intellectual Property Rights– Unleashmy The Knowledge Economy, Prabuddha  
Ganguli, Tate Mc Graw Hill Publishing Company Ltd.,

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**15A05609 WEB AND INTERNET TECHNOLOGIES LABORATORY****Course Objectives:**

- To introduce client side scripting with Javascript and DHTML
- To introduce server side programming with Java servlets, JSP and PHP.
- To learn the basic web concepts and Internet protocols

**Course Outcomes:**

- Ability to create dynamic and interactive web sites.
  - Gain knowledge of client side scripting using java sript and DHTML.
  - Demonstrate understanding of what is XML and how to parse and use XML data
  - Able to do server side programming with Java Servelets, JSP and PHP.
1. To create a simple student bio-data form using html5 . it should contain the following name (text box), address (multiline text box),gender (radio button male,female),skill sets known (check boxes – c,c++,java,C#etc), extra curricular activities (text box), nationality (combobox) ,submit and reset button.
  2. To create an html page with different types of frames such as floating frame, navigation frame & mixed frame.
  3. Design the webpage by applying the different styles using inline, external & internal style sheets.
  4. Write a java script program to read .XML file and display data in a neat format.
  5. To write a Javascript program to define a user defined function for sorting the values in an array. Use HTML5 for user interface.
  6. To create an html page to demonstrate exception handling in javascript  
Create an html page named as “exception.html” and do the following.
    - i. within the script tag write code to handle exception
      - a) define a method RunTest() to get any string values(str) from the user and call the method Areletters(str).
      - b) In Areletters(str) method check whether str contain only alphabets (a-z, A-Z), if not throw exception.
      - c) Define a exception method Input Exception(str) to handle the exception thrown by the above method.
    - ii. Within the body tag define a script tag to call Runtest() method define.



7. Write a jsp servlet program to implement the single text field calculator.
8. Write a jsp servlet program to demonstrate session handling using
  - url rewriting
  - hidden formfield
  - cookies
  - sessions
9. To create a php program to demonstrate the different predefined function in array, Math, Data & Regular Expression.

Procedure:

- Create php file named as Regularexpression.php
  - for demonstrating the method for handling various strings with regular expression Array.php
  - for demonstrating the methods for handling the array values Math\_function.php
  - to demonstrate the predefined in math objects. Date\_time.php to demonstrate the predefined function in date subject
10. Write a program in PHP for a simple email processing with attachment using forms
  11. Write a program for PHP for a login script ; create a login database and store username and password
  12. Write a program in PHP to add, update and delete using student database
  13. Create a DTD to describe a library. Library has one or more books, members and staffs.
    - Each book has BookID(Attribute), Title, one or more Authors, Publisher Year of Publication, ISBN and Price.
    - Each Member has MemberID(Attribute), Name, Address, Phone number.
    - Each Staff has StaffID(Attribute), Name, Address, Phone number.
    - Each Author has AuthorID(Attribute), Name, Address, Phone number.
    - Each Publisher has PublisherID(Attribute), Name, Address, Phone number.
    - Use it in a XML document.
  14. Create a DTD to describe a Computer. A computer has following details,
    - Type of computer (this is an attribute), Which can be Desktop PC, Laptop, Palm Top, Server, Minicomputer or mainframe)
    - A Monitor with Serial Number (Attribute), Make, Model, Year of manufacture, Size, Type (which is either colour or monochrome)
    - A keyboard with Serial Number (Attribute), Make, Model, Year of manufacture, No of keys, Type( which is either Standard or Enhanced or Multimedia)
    - A mouse with Serial Number (Attribute), Make, Model, Year of manufacture, No of buttons, Scroll wheel (which is yes or no), Type (Which is Ball or Optical)

- A Mother board with Serial Number (Attribute), Make, Model, Year of manufacture, No of USB ports, No of IDE slots, No of SATA hubs, No of PCI slots, Display Type(Which is VGA or HDMI), Number of Processor slots, Type of Processors supported (must be a list), Type of RAM supported (Which is either SD or DDR1 or DDR2 or RD), Maximum Capacity of RAM, Form Factor (which is either AT or Baby AT), On Board sound card (Which is yes or no)
- A Microprocessor with Serial Number (Attribute), Make, Model, Year of manufacture, speed (in GHz), No of Cores (Single, Dual, Quad)
- A power supply with Serial Number (Attribute), Make, Model, Year of manufacture, Type (AT, ATX), Wattage
- One or more hard disks, each Hard disk must have Serial Number (Attribute), Make, Model, Year of manufacture, capacity and type (Which is IDE or SATAI or SATAII, SCSI)
- One or more RAM SIMM, with Serial Number (Attribute), Make, Model, Year of manufacture, Type (which must be SD, DDRI, DDRII, RD), capacity, operating frequency.  
Use it in a XML document.

15. Create a Schema to describe a Computer. Use the previous question's details and show an instance XML document.

16. Create a Schema to describe a library. Library has one or more - books, members and staffs.

- Each book has BookID(Attribute), Title, one or more Authors, Publisher Year of Publication, ISBN and Price.
- Each Member has MemeberID(Attribute), Name, Address, Phone number.
- Each Staff has StaffID(Attribute), Name, Address, Phone number.
- Each Author has AuthorID(Attribute), Name, Address, Phone number.
- Each Publisher has PublisherID(Attribute), Name, Address, Phone number.

Use the above DTD in a sample XML document.

17. Create a DTD to describe a bank that has one or more customers, accounts or Employee.

- Each Customer has a Customer ID, Name and address.
- Each account has an account ID, BranchID, CustomerID, AccountType and Balance.
- Each Employee has aEmpID, Name, Designation, DOJ, Salary and Address.

Use this DTD in a XML file.

18. Create Schema describe a bank that has one or more customers, accounts or depositors. Use the previous questions details. Also show a sample instance XML document.

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	<b>0</b>	<b>0</b>	<b>4</b>	<b>2</b>

**15A05610 DATA WAREHOUSING & MINING LABORATORY****Course Objectives:**

Learn how to build a data warehouse and query it (using open source tools like Pentaho Data Integration and Pentaho Business Analytics), Learn to perform data mining tasks using a data mining toolkit (such as open source WEKA), Understand the data sets and data preprocessing, Demonstrate the working of algorithms for data mining tasks such as association rule mining, classification, clustering and regression, Exercise the data mining techniques with varied input values for different parameters.

**Course Outcomes:**

- Ability to build Data Warehouse and Explore WEKA
- Ability to perform data preprocessing tasks and Demonstrate performing association rule mining on data sets
- Ability to perform classification, clustering and regression on data sets
- Ability to design data mining algorithms

**Data Warehousing****Experiments:****Build Data Warehouse and Explore WEKA**

- A. Build a Data Warehouse/Data Mart (using open source tools like Pentaho Data Integration tool, Pentaho Business Analytics; or other data warehouse tools like Microsoft-SSIS, Informatica, Business Objects, etc.).
  - (i). Identify source tables and populate sample data
  - (ii). Design multi-dimensional data models namely Star, snowflake and Fact constellation schemas for any one enterprise (ex. Banking, Insurance, Finance, Healthcare, Manufacturing, Automobile, etc.).
  - (iii). Write ETL scripts and implement using data warehouse tools
  - (iv). Perform various OLAP operations such as slice, dice, roll up, drill up and pivot
  - (v). Explore visualization features of the tool for analysis like identifying trends etc.

- B. Explore WEKA Data Mining/Machine Learning Toolkit
  - (i). Downloading and/or installation of WEKA data mining toolkit,
  - (ii). Understand the features of WEKA toolkit such as Explorer, Knowledge Flow interface, Experimenter, command-line interface.
  - (iii). Navigate the options available in the WEKA (ex. Select attributes panel, Preprocess panel, Classify panel, Cluster panel, Associate panel and Visualize panel)
  - (iv). Study the arff file format
  - (v). Explore the available data sets in WEKA.
  - (vi). Load a data set (ex. Weather dataset, Iris dataset, etc.)
  - (vii). Load each dataset and observe the following:
    - i. List the attribute names and they types
    - ii. Number of records in each dataset
    - iii. Identify the class attribute (if any)
    - iv. Plot Histogram
    - v. Determine the number of records for each class.
    - vi. Visualize the data in various dimensions

### **Perform data preprocessing tasks and Demonstrate performing association rule mining on data sets**

- A. Explore various options available in Weka for preprocessing data and apply (like Discretization Filters, Resample filter, etc.) on each dataset
- B. Load each dataset into Weka and run Apriori algorithm with different support and confidence values. Study the rules generated.
- C. Apply different discretization filters on numerical attributes and run the Apriori association rule algorithm. Study the rules generated. Derive interesting insights and observe the effect of discretization in the rule generation process.

### **Demonstrate performing classification on data sets**

- A. Load each dataset into Weka and run Id3, J48 classification algorithm. Study the classifier output. Compute entropy values, Kappa statistic.
- B. Extract if-then rules from the decision tree generated by the classifier, Observe the confusion matrix and derive Accuracy, F-measure, TPrate, FPrate, Precision and Recall values. Apply cross-validation strategy with various fold levels and compare the accuracy results.
- C. Load each dataset into Weka and perform Naïve-bayes classification and k-Nearest Neighbour classification. Interpret the results obtained.
- D. Plot RoC Curves

- E. Compare classification results of ID3, J48, Naïve-Bayes and k-NN classifiers for each dataset, and deduce which classifier is performing best and poor for each dataset and justify.

**Demonstrate performing clustering on data sets**

- A. Load each dataset into Weka and run simple k-means clustering algorithm with different values of k (number of desired clusters). Study the clusters formed. Observe the sum of squared errors and centroids, and derive insights.
- B. Explore other clustering techniques available in Weka.
- C. Explore visualization features of Weka to visualize the clusters. Derive interesting insights and explain.

**Demonstrate performing Regression on data sets**

- A. Load each dataset into Weka and build Linear Regression model. Study the clusters formed. Use Training set option. Interpret the regression model and derive patterns and conclusions from the regression results.
- B. Use options cross-validation and percentage split and repeat running the Linear Regression Model. Observe the results and derive meaningful results.
- C. Explore Simple linear regression technique that only looks at one variable

**Resource Sites:**

1. <http://www.pentaho.com/>
2. <http://www.cs.waikato.ac.nz/ml/weka/>

**Data Mining****Task 1: Credit Risk Assessment****Description:**

The business of banks is making loans. Assessing the credit worthiness of an applicant is of crucial importance. You have to develop a system to help a loan officer decide whether the credit of a customer is good, or bad. A bank's business rules regarding loans must consider two opposing factors. On the one hand, a bank wants to make as many loans as possible. Interest on these loans is the banks profit source. On the other hand, a bank cannot afford to make too many bad loans. Too many bad loans could lead to the collapse of the bank. The bank's loan policy must involve a compromise: not too strict, and not too lenient.

To do the assignment, you first and foremost need is some knowledge about the world of credit. You can acquire such knowledge in a number of ways.

1. Knowledge Engineering. Find a loan officer who is willing to talk. Interview her and try to represent her knowledge in the form of production rules.
2. Books. Find some training manuals for loan officers or perhaps a suitable textbook on finance. Translate this knowledge from text form to production rule form.
3. Common sense. Imagine yourself as a loan officer and make up reasonable rules which can be used to judge the credit worthiness of a loan applicant.
4. Case histories. Find records of actual cases where competent loan officers correctly judged when, and when not to, approve a loan application.

### **The German Credit Data:**

Actual historical credit data is not always easy to come by because of confidentiality rules. Here is one such dataset, consisting of 1000 actual cases collected in Germany. [credit dataset \(original\)](#) Excel [spreadsheet](#) version of the German credit data.

In spite of the fact that the data is German, you should probably make use of it for this assignment. (Unless you really can consult a real loan officer !)

A few notes on the German dataset

- DM stands for Deutsche Mark, the unit of currency, worth about 90 cents Canadian (but looks and acts like a quarter).
- Owns\_telephone. German phone rates are much higher. So fewer people own telephones.
- Foreign\_worker. There are millions of these in Germany (many from Turkey). It is very hard to get German citizenship if you were not born of German parents.
- There are 20 attributes used in judging a loan applicant. The goal is to classify the applicant into one of two categories, good or bad.

### **Subtasks: (Turn in your answers to the following tasks)**

1. List all the categorical (or nominal) attributes and the real-valued attributes separately.
2. What attributes do you think might be crucial in making the credit assessment ? Come up with some simple rules in plain English using your selected attributes.
3. One type of model that you can create is a Decision Tree - train a Decision Tree using the complete dataset as the training data. Report the model obtained after training.

4. Suppose you use your above model trained on the complete dataset, and classify credit good/bad for each of the examples in the dataset. What % of examples can you classify correctly? (This is also called testing on the training set) Why do you think you cannot get 100 % training accuracy?
5. Is testing on the training set as you did above a good idea? Why or Why not ?
6. One approach for solving the problem encountered in the previous question is using cross-validation? Describe what is cross-validation briefly. Train a Decision Tree again using cross-validation and report your results. Does your accuracy increase/decrease? Why?
7. Check to see if the data shows a bias against "foreign workers" (attribute 20), or "personal-status" (attribute 9). One way to do this (perhaps rather simple minded) is to remove these attributes from the dataset and see if the decision tree created in those cases is significantly different from the full dataset case which you have already done. To remove an attribute you can use the preprocess tab in Weka's GUI Explorer. Did removing these attributes have any significant effect?
8. Another question might be, do you really need to input so many attributes to get good results? Maybe only a few would do. For example, you could try just having attributes 2, 3, 5, 7, 10, 17 (and 21, the class attribute (naturally)). Try out some combinations. (You had removed two attributes in problem 7. Remember to reload the arff data file to get all the attributes initially before you start selecting the ones you want.)
9. Sometimes, the cost of rejecting an applicant who actually has a good credit (case 1) might be higher than accepting an applicant who has bad credit (case 2). Instead of counting the misclassifications equally in both cases, give a higher cost to the first case (say cost 5) and lower cost to the second case. You can do this by using a cost matrix in Weka. Train your Decision Tree again and report the Decision Tree and cross-validation results. Are they significantly different from results obtained in problem 6 (using equal cost)?
10. Do you think it is a good idea to prefer simple decision trees instead of having long complex decision trees? How does the complexity of a Decision Tree relate to the bias of the model?
11. You can make your Decision Trees simpler by pruning the nodes. One approach is to use Reduced Error Pruning. Try reduced error pruning for training your Decision Trees using cross-validation (you can do this in Weka) and report the Decision Tree you

obtain? Also, report your accuracy using the pruned model. Does your accuracy increase?

12.(Extra Credit): How can you convert a Decision Trees into "if-then-else rules". Make up your own small Decision Tree consisting of 2-3 levels and convert it into a set of rules. There also exist different classifiers that output the model in the form of rules - one such classifier in Weka is rules. PART, train this model and report the set of rules obtained. Sometimes just one attribute can be good enough in making the decision, yes, just one ! Can you predict what attribute that might be in this dataset ? OneR classifier uses a single attribute to make decisions (it chooses the attribute based on minimum error). Report the rule obtained by training a one R classifier. Rank the performance of j48, PART and oneR.

### Task Resources:

- [Andrew Moore's Data Mining Tutorials](#) (See tutorials on Decision Trees and Cross Validation)
- [Decision Trees](#) (Source: Tan, MSU)
- [Tom Mitchell's book slides](#) (See slides on Concept Learning and Decision Trees)
- Weka resources:
  - o [Introduction to Weka](#) (html version) (download [ppt](#) version)
  - o [Download Weka](#)
  - o [Weka Tutorial](#)
  - o [ARFF format](#)
  - o [Using Weka from command line](#)

### Task 2: Hospital Management System

Data Warehouse consists Dimension Table and Fact Table.

REMEMBER The following

Dimension

The dimension object (Dimension):

\_ Name

\_ Attributes (Levels) , with one primary key

\_ Hierarchies

One time dimension is must.

About Levels and Hierarchies

Dimension objects (dimension) consist of a set of levels and a set of hierarchies defined over those levels. The levels represent levels of aggregation. Hierarchies describe parent-child relationships among a set of levels.

For example, a typical calendar dimension could contain five levels. Two hierarchies can be defined on these levels:



H1: YearL > QuarterL > MonthL > WeekL > DayL

H2: YearL > WeekL > DayL

The hierarchies are described from parent to child, so that Year is the parent of Quarter, Quarter the parent of Month, and so forth.

About Unique Key Constraints

When you create a definition for a hierarchy, Warehouse Builder creates an identifier key for each level of the hierarchy and a unique key constraint on the lowest level (Base Level)

Design a Hospital Management system data warehouse (TARGET) consistig of Dimensions Patient, Medicine, Supplier, Time. Where measures are ' NO UNITS', UNIT PRICE.

Assume the Relational database (SOURCE) table schemas as follows

TIME (day, month, year),

PATIENT (patient\_name, Age, Address, etc..)

MEDICINE ( Medicine\_Brand\_name, Drug\_name, Supplier, no\_units, Uunit\_Price, etc..)

SUPPLIER :( Supplier\_name, Medicine\_Brand\_name, Address, etc., )

If each Dimension has 6 levels, decide the levels and hierarchies, Assume the level names suitably.

Design the Hospital Management system data warehouse using all schemas. Give the example 4-D cube with assumption names.

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**15A52602      ADVANCED ENGLISH LANGUAGE COMMUNICATION  
SKILLS (AELCS) LAB (Audit Course)**

**1. Introduction**

With increased globalization and rapidly changing industry expectations, employers are looking for the wide cluster of skills to cater to the changing demand. The introduction of the Advanced Communication Skills Lab is considered essential at 3<sup>rd</sup> 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 and to organise ideas relevantly and coherently.
- Engaging in debates.
- Participating in group discussions.
- Facing interviews.
- Writing project/research reports/technical reports.
- Making oral presentations.
- 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.

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**3. SYLLABUS:**

The following course content to conduct the activities is prescribed for the Advanced English Communication Skills (AECS) Lab:

**UNIT-I: COMMUNICATION SKILLS**

1. Reading Comprehension
2. Listening comprehension
3. Vocabulary Development
4. Common Errors

**UNIT-II: WRITING SKILLS**

1. Report writing
2. Resume Preparation
3. E-mail Writing

**UNIT-III: PRESENTATION SKILLS**

1. Oral presentation
2. Power point presentation
3. Poster presentation

**UNIT-IV: GETTING READY FOR JOB**

1. Debates
2. Group discussions
3. Job Interviews

**UNIT-V: INTERPERSONAL SKILLS**

1. Time Management
2. Problem Solving & Decision Making
3. Etiquettes

**4. LEARNING OUTCOMES:**

- Accomplishment of sound vocabulary and its proper use contextually
- Flair in Writing and felicity in written expression.
- Enhanced job prospects.
- Effective Speaking Abilities

## **5. MINIMUM REQUIREMENT:**

The Advanced English Communication Skills (AECS) Laboratory shall have the following infra-structural facilities to accommodate at least 60 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 G

1. **Walden Infotech: Advanced English Communication Skills Lab**
2. **K-VAN SOLUTIONS-Advanced English Language Communication Skills lab**
3. **DELTA's key to the Next Generation TOEFL Test: Advanced Skills Practice.**
4. **TOEFL & GRE( KAPLAN, AARCO & BARRONS, USA, Cracking GRE by CLIFFS)**
5. **Train2success.com**

## **7. BOOKS RECOMMENDED:**

1. **Objective English for Competitive Exams**, Hari Mohana Prasad, 4<sup>th</sup> edition, Tata Mc Graw Hill.
2. **Technical Communication** by Meenakshi Raman & Sangeeta Sharma, O U Press 3<sup>rd</sup> Edn. 2015.
3. **Essay Writing for Exams, Audrone Raskauskiene, Irena Ragaisience & Ramute Zemaitience,OUP, 2016**
4. **Soft Skills for Everyone**, Butterfield Jeff, Cengage Publications, 2011.
5. **Management Shapers Series** by Universities Press (India) Pvt Ltd., Himayatnagar, Hyderabad 2008.
6. **Campus to Corporate**, Gangadhar Joshi, Sage Publications, 2015

7. **Communicative English**, E Suresh Kumar & P.Sreehari, Orient Blackswan, 2009.
8. **English for Success in Competitive Exams**, Philip Sunil Solomon OUP, 2015

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**15A52601 MANAGEMENT SCIENCE**

**Course Objectives:** *The objective of the course is to equip the student the fundamental knowledge of management science and its application for effective management of human resource, materials and operation of an organization. It also aims to expose the students about the latest and contemporary developments in the field of management.*

**UNIT –I: Introduction to Management:** Concept-Nature and Importance of Management, Functions-Evaluation of Scientific Management, Modern management-Motivation Theories-Leadership Styles-Decision Making Process-Designing Organization Structure-Principles and Types of Organization.

**UNIT- II: Operations Management:** Plant location and Layout, Methods of production, Work-Study-Statistical Quality Control through Control Charts, Objectives of Inventory Management, Need for Inventory Control-EOQ&ABC Analysis(Simple Problems)**Marketing Management:** Meaning, Nature, Functions of Marketing, Marketing Mix, Channels of distribution- Advertisement and sales promotion-Marketing strategies-Product Life Cycle.

**UNIT -III: Human Resource Management (HRM):** Significant and Basic functions of HRM-Human Resource Planning(HRP), Job evaluation, Recruitment and Selection, Placement and Induction-Wage and Salary administration. Employee Training and development-Methods-Performance Appraisal-Employee Grievances-techniques of handling Grievances.

**UNIT –IV: Strategic Management:** Vision, Mission, Goals and Strategy- Corporate Planning Process-Environmental Scanning-SWOT analysis-Different Steps in Strateg Formulation, Implementation and Evaluation. **Project Management:** Network Analysis- PERT, CPM, Identifying Critical Path-Probability-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 and Capability Maturity Models(CMM) evies, Supply Chain Management, Enterprise Resource Planning(ERP),Performance Management,

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Business Process Outsourcing(BPO), Business Process Re-Engineering and Bench Marking, Balance Score Card.

**Course Outcomes:** This course enables the student to know the principles and applications of management knowledge and exposure to the latest developments in the field. This helps to take effective and efficient management decisions on physical and human resources of an organization. Beside the knowledge of Management Science facilitates for his/her personal and professional development.

**TEXT BOOKS:**

1. A.R Aryasri: Management Science, TMH, 2013
2. Kumar /Rao/Chalill 'Introduction to Management Science' Cengage, Delhi, 2012.

**REFERENCE BOOKS:**

1. A.K.Gupta "Engineering Management",S.CHAND, New Delhi, 2016.
2. Stoner, Freeman, Gilbert, Management, Pearson Education,New Delhi, 2012.
3. Kotler Philip & Keller Kevin Lane: Marketing Mangement , PHI,2013.
5. Koontz & Weihrich: Essentials of Management, 6/e, TMH, 2005.
6. Kanishka Bedi, Production and Operations Management, Oxford University Press, 2004.
7. Memoria & S.V.Gauker, Personnel Management, Himalaya, 25/e, 2005
8. Parnell: Strategic Management, Biztantra, 2003.
9. L.S.Srinath: PERT/CPM,Affiliated East-West Press, 2005.

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	<b>3</b>	<b>1</b>	<b>0</b>	<b>3</b>

**15A05701 GRID AND CLOUD COMPUTING****Course Objectives:**

The student should be made to:

- Understand how Grid computing helps in solving large scale scientific problems.
- Gain knowledge on the concept of virtualization that is fundamental to cloud computing. Learn how to program the grid and the cloud.
- Understand the security issues in the grid and the cloud environment.

**Course Outcomes:**

The student should be able to

- Apply the security models in the grid and the cloud environment.
- Use the grid and cloud tool kits.
- Apply the concept of virtualization.
- Apply grid computing techniques to solve large scale scientific problems

**UNIT I INTRODUCTION**

Evolution of Distributed computing: Scalable computing over the Internet – Technologies for network based systems – clusters of cooperative computers - Grid computing Infrastructures – cloud computing - service oriented architecture – Introduction to Grid Architecture and standards – Elements of Grid – Overview of Grid Architecture.

**UNIT II GRID SERVICES**

Introduction to Open Grid Services Architecture (OGSA) – Motivation – Functionality Requirements – Practical & Detailed view of OGSA/OGSI – Data intensive grid service models – OGSA services.

**UNIT III VIRTUALIZATION**

Cloud deployment models: public, private, hybrid, community – Categories of cloud computing: Everything as a service: Infrastructure, platform, software - Pros and Cons of cloud computing – Implementation levels of virtualization – virtualization structure – virtualization of CPU, Memory and I/O devices – virtual clusters and Resource



Management – Virtualization for data center automation.

#### **UNIT IV PROGRAMMING MODEL**

Open source grid middleware packages – Globus Toolkit (GT4) Architecture , Configuration – Usage of Globus – Main components and Programming model - Introduction to Hadoop Framework - Mapreduce, Input splitting, map and reduce functions, specifying input and output parameters, configuring and running a job – Design of Hadoop file system, HDFS concepts, command line and java interface, dataflow of File read & File write.

#### **UNIT V SECURITY**

Trust models for Grid security environment – Authentication and Authorization methods – Grid security infrastructure – Cloud Infrastructure security: network, host and application level – aspects of data security, provider data and its security, Identity and access management architecture, IAM practices in the cloud, SaaS, PaaS, IaaS availability in the cloud, Key privacy issues in the cloud.

#### **TEXT BOOK:**

1. Kai Hwang, Geoffery C. Fox and Jack J. Dongarra, “Distributed and Cloud Computing: Clusters, Grids, Clouds and the Future of Internet”, First Edition, Morgan Kaufman Publisher, an Imprint of Elsevier, 2012.

#### **REFERENCES:**

1. Jason Venner, “Pro Hadoop- Build Scalable, Distributed Applications in the Cloud”, A Press, 2009
2. Tom White, “Hadoop The Definitive Guide”, First Edition. O’Reilly, 2009.
3. Bart Jacob (Editor), “Introduction to Grid Computing”, IBM Red Books, Vervante, 2005
4. Ian Foster, Carl Kesselman, “The Grid: Blueprint for a New Computing Infrastructure”, 2<sup>nd</sup> Edition, Morgan Kaufmann.
5. Frederic Magoules and Jie Pan, “Introduction to Grid Computing” CRC Press, 2009.
6. Daniel Minoli, “A Networking Approach to Grid Computing”, John Wiley Publication, 2005.
7. Barry Wilkinson, “Grid Computing: Techniques and Applications”, Chapman and Hall, CRC, Taylor and Francis Group, 2010.

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	<b>3</b>	<b>1</b>	<b>0</b>	<b>3</b>

**15A05702 INFORMATION SECURITY****Course Objectives:**

- Extensive, thorough and significant understanding of the concepts, issues, principles and theories of computer network security
- Identifying the suitable points for applying security features for network traffic
- Understanding the various cryptographic algorithms and implementation of the same at software level
- Understanding the various attacks, security mechanisms and services

**Course Outcomes:**

- Protect the network from both internal and external attacks
- Design of new security approaches
- Ability to choose the appropriate security algorithm based on the requirements.

**Unit-I**

Computer Security concepts, The OSI Security Architecture, Security attacks, Security services and Security mechanisms, A model for Network Security

Classical encryption techniques- symmetric cipher model, substitution ciphers, transposition ciphers, Steganography.

Modern Block Ciphers: Block ciphers principles, Data encryption standard (DES), Strength of DES, linear and differential cryptanalysis, block cipher modes of operations, AES, RC4.

**Unit-II**

Introduction to Number theory – Integer Arithmetic, Modular Arithmetic, Matrices, Linear Congruence, Algebraic Structures,  $GF(2^n)$  Fields, Primes, Primality Testing, Factorization, Chinese remainder Theorem, Quadratic Congruence, Exponentiation and Logarithm.

Public-key cryptography - Principles of public-key cryptography, RSA Algorithm, Diffie-Hellman Key Exchange, ElGamal cryptographic system, Elliptic Curve Arithmetic, Elliptic curve cryptography

**Unit-III**

Cryptographic Hash functions: Applications of Cryptographic Hash functions, Requirements and security, Hash functions based on Cipher Block Chaining, Secure Hash Algorithm (SHA)

Message Authentication Codes: Message authentication Requirements, Message authentication functions, Requirements for Message authentication codes, security of MACs, HMAC, MACs based on Block Ciphers, Authenticated Encryption  
Digital Signatures-RSA with SHA & DSS

**Unit-IV**

Key Management and distribution: Symmetric key distribution using Symmetric Encryption, Symmetric key distribution using Asymmetric, Distribution of Public keys, X.509 Certificates, Public key Infrastructure.

User Authentication: Remote user Authentication Principles, Remote user Authentication using Symmetric Encryption, Kerberos, Remote user Authentication using Asymmetric Encryption, Federated Identity Management, Electronic mail security: Pretty Good Privacy (PGP), S/MIME.

**Unit-V**

Security at the Transport Layer(SSL and TLS) : SSL Architecture, Four Protocols, SSL Message Formats, Transport Layer Security, HTTPS, SSH

Security at the Network layer (IPSec): Two modes, Two Security Protocols, Security Association, Security Policy, Internet Key Exchange.

System Security: Description of the system, users, Trust and Trusted Systems, Buffer Overflow and Malicious Software, Malicious Programs, worms, viruses, Intrusion Detection System(IDS), Firewalls

**Text books:**

1. "Cryptography and Network Security", Behrouz A. Frouzan and Debdeep Mukhopadhyay, Mc Graw Hill Education, 2<sup>nd</sup> edition, 2013.
2. "Cryptography and Network Security: Principals and Practice", William Stallings, Pearson Education , Fifth Edition, 2013.

**References:**

1. "Network Security and Cryptography", Bernard Menezes , Cengage Learning.
2. "Cryptography and Security", C.K. Shymala, N. Harini and Dr. T.R. Padmanabhan, Wiley-India.
3. "Applied Cryptography, Bruce Schiener, 2<sup>nd</sup> edition, John Wiley & Sons.
4. "Cryptography and Network Security", Atul Kahate, TMH.
5. "Introduction to Cryptography", Buchmann, Springer.
6. "Number Theory in the Spirit of Ramanujan", Bruce C.Berndt, University Press
7. "Introduction to Analytic Number Theory", Tom M.Apostol, University Press

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<b>B. Tech IV-I Sem. (CSE)</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	<b>3</b>	<b>1</b>	<b>0</b>	<b>3</b>

**15A05703 MOBILE APPLICATION DEVELOPMENT****Course Objectives:**

- To understand fundamentals of android operating systems.
- Illustrate the various components, layouts and views in creating android applications
- To understand fundamentals of android programming.

**Course Outcomes:**

- Create data sharing with different applications and sending and intercepting SMS.
- Develop applications using services and publishing android applications.
- To demonstrate their skills of using Android software development tools

**Unit 1: Introduction to Android:**

The Android 4.1 jelly Bean SDK, Understanding the Android Software Stack, installing the Android SDK, Creating Android Virtual Devices, Creating the First Android Project, Using the Text view Control, Using the Android Emulator, The Android Debug Bridge(ADB), Launching Android Applications on a Handset.

**Unit 2: Basic Widgets:**

Understanding the Role of Android Application Components, Understanding the Utility of Android API, Overview of the Android Project Files, Understanding Activities, Role of the Android Manifest File, Creating the User Interface, Commonly Used Layouts and Controls, Event Handling, Displaying Messages Through Toast, Creating and Starting an Activity, Using the Edit Text Control, Choosing Options with Checkbox, Choosing Mutually Exclusive Items Using Radio Buttons

**Unit 3: Building Blocks for Android Application Design:**

Introduction to Layouts, Linear Layout, Relative Layout, Absolute Layout, Using Image View, Frame Layout, Table Layout, Grid Layout, Adapting to Screen orientation.

**Utilizing Resources and Media** Resources, Creating Values Resources, Using Drawable Resources, Switching States with Toggle Buttons, Creating an Images Switcher Application, Scrolling Through Scroll View, playing Audio, Playing Video, Displaying Progress with Progress Bar, Using Assets.

**Unit 4: Using Selection widgets and Debugging:**

Using List View, Using the Spinner control, Using the GridView Control, Creating an Image Gallery Using the ViewPager Control, Using the Debugging Tool: Dalvik Debug Monitor Service(DDMS), Debugging Application, Using the Debug Perspective.

**Displaying And Fetching Information Using Dialogs and Fragments:** What Are Dialogs?, Selecting the Date and Time in One Application, Fragments, Creating Fragments with java Code, Creating Special Fragments

**Unit 5: Building Menus and Storing Data:**

Creating Interface Menus and Action Bars, Menus and Their Types, Creating Menus Through XML, Creating Menus Through Coding, Applying a Context Menu to a List View, Using the Action Bar, Replacing a Menu with the Action Bar, Creating a Tabbed Action Bar, Creating a Drop-Down List Action Bar

**Using Databases:**

Using the SQLiteOpenHelperclasss, Accessing Databases with the ADB, Creating a Data Entry Form,

**Communicating with SMS and Emails:**

Understanding Broadcast Receivers, Using the Notification System, Sending SMS Messages with Java Code, Receiving SMS Messages, Sending Email, Working With Telephony Manager.

**Text Books**

1. Android Programming by B.M Harwani, Pearson Education, 2013.

**References Text Books:**

1. Android application Development for Java Programmers, James C Sheusi, Cengage Learning
2. Android In Action by w.Frank Ableson, Robi Sen, Chris King, C. Enrique Ortiz., Dreamtech.
3. Professional Android 4 applications development, Reto Meier, Wiley India, 2012.
4. Beginning Android 4 applications development, Wei- Meng Lee, Wiley India,2013

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<b>15A05704</b>	<b>SOFTWARE ARCHITECTURE (CBCC-II)</b>			

**Course Objectives:**

- Introduction to the fundamentals of software architecture.
- Software architecture and quality requirements of a software system
- Fundamental principles and guidelines for software architecture design, architectural styles, patterns, and frameworks.
- Methods, techniques, and tools for describing software architecture and documenting design rationale.
- Software architecture design and evaluation processes.

**Course Outcomes:**

- The student will be able to:
- Design and motivate software architecture for large scale software systems
- Recognize major software architectural styles, design patterns, and frameworks
- Describe a software architecture using various documentation approaches and architectural description languages
- Generate architectural alternatives for a problem and select among them
- Use well-understood paradigms for designing new systems

**UNIT I: ENVISIONING ARCHITECTURE**

What is software Architecture-What is Software Architecture, Other Points of View, Architectural Patterns, Reference Models, and Reference Architectures, Importance of Software Architecture, Architectural Structures and views.

**ENVISIONING ARCHITECTURE:**

Architecture Business Cycle- Architectures influences, Software Processes and the Architecture Business Cycle, Making of "Good" Architecture.

**UNIT II: DESIGNING THE ARCHITECTURE WITH STYLES**

Designing the Architecture: Architecture in the Life Cycle, Designing the Architecture, Formatting the Team Structure, Creating a Skeletal System.

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Architecture Styles: Architectural Styles, Pipes and Filters, Data Abstraction and Object-Oriented Organization, Event-Based, Implicit Invocation, Layered Systems, Repositories, Interpreters.2013-2014

**UNIT III: CREATING AN ARCHITECTURE-I**

Creating an Architecture: Understanding Quality Attributes – Functionality and Architecture, Architecture and Quality Attributes, System Quality Attributes, Quality Attribute. Scenarios in Practice, Other System Quality Attributes, Business Qualities, Architecture Qualities.

Achieving Qualities: Introducing Tactics, Availability Tactics, Modifiability Tactics, Performance Tactics, Security Tactics, Testability Tactics, Usability Tactics.

**UNIT IV: CREATING AN ARCHITECTURE-II**

Documenting Software Architectures: Use of Architectural Documentation, Views, Choosing the Relevant Views, Documenting a view, Documentation across Views. Reconstructing Software Architecture: Introduction, Information Extraction, Database Construction, View Fusion, and Reconstruction.

**UNIT V: ANALYZING ARCHITECTURES**

The ATAM: Participants in the ATAM, Outputs of The ATAM, Phases Of the ATAM. The CBAM: Decision-Making Context, The Basis for the CBAM, Implementing the CBAM. The World Wide Web:A Case study in Interoperability- Relationship to the Architecture Business Cycle, Requirements and Qualities, Architecture Solution, Achieving Quality Goals.

**TEXT BOOKS:**

1. Software Architectures in Practice , Len Bass, Paul Clements, Rick Kazman, 2nd Edition, Pearson Publication.
2. Software Architecture , Mary Shaw and David Garlan, First Edition, PHI Publication, 1996.

**REFERENCES BOOKS:**

1. **Software Design: From Programming to Architecture**, Eric Braude, Wiley, 2004.
2. N. Domains of Concern in Software Architectures and Architecture Description Languages. Medvidovic and D. S. Rosenblum. USENIX.

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**15A05705      COMPUTER GRAPHICS  
(CBCC-II)****Course Objectives:**

- To provide students with an understanding of the algorithms and theories that form the basis of computer graphics and modeling.
- To give students skills necessary in the production of 2D &3D models.

**Course Outcomes:**

- Acquire familiarity with the relevant mathematics of computer graphics.
- Be able to design basic graphics application programs, including animation
- Be able to design applications that display graphic images to given specifications

**UNIT I**

**Introduction**, Application areas of Computer Graphics, overview of graphics systems, video-display devices, raster-scan systems, random scan systems, graphics monitors and work stations and input devices

Output primitives: Points and lines, line drawing algorithms, mid-point circle and ellipse algorithms. Filled area primitives: Scan line polygon fill algorithm, boundary-fill and flood-fill algorithms.

**UNIT II**

**2-D Geometrical transforms:** Translation, scaling, rotation, reflection and shear transformations, matrix representations and homogeneous coordinates, composite transforms, transformations between coordinate systems.

**2-D Viewing :** The viewing pipeline, viewing coordinate reference frame, window to view-port coordinate transformation, viewing functions, Cohen-Sutherland and Cyrus-beck line clipping algorithms, Sutherland –Hodgeman polygon clipping algorithm.

**UNIT III**

**3-D Object representation:** Polygon surfaces, quadric surfaces, spline representation, Hermite curve, Bezier curve and B-spline curves, Bezier and B-spline surfaces. Basic illumination models, polygon rendering methods.

**UNIT IV**



**3-D Geometric transformations:** Translation, rotation, scaling, reflection and shear transformations, composite transformations, 3-D viewing: Viewing pipeline, viewing coordinates, view volume and general projection transforms and clipping.

#### **UNIT V**

**Visible surface detection methods:** Classification, back-face detection, depth-buffer, scan-line, depth sorting, BSP-tree methods, area sub-division and octree methods  
**Computer animation:** Design of animation sequence, general computer animation functions, raster animation, computer animation languages, key frame systems, motion specifications

#### **TEXT BOOKS:**

1. "Computer Graphics C version", Donald Hearn and M. Pauline Baker, Pearson education.
2. "Computer Graphics Principles & practice", second edition in C, Foley, VanDam, Feiner and Hughes, Pearson Education.

#### **REFERENCE BOOKS:**

1. "Computer Graphics Second edition", Zhigand xiang, Roy Plastock, Schaum's outlines, Tata Mc Graw hill edition.
2. "Procedural elements for Computer Graphics", David F Rogers, Tata Mc Graw hill, 2nd edition.
3. "Principles of Interactive Computer Graphics", Neuman and Sproul, TMH.
4. "Principles of Computer Graphics", Shalini, Govil-Pai, Springer.
5. "Computer Graphics", Steven Harrington, TMH.
6. Computer Graphics, F.S.Hill, S.M.Kelley, PHI.
7. Computer Graphics, P. Shirley, Steve Marschner & Others, Cengage Learning.
8. Computer Graphics & Animation, M.C.Trivedi, Jaico Publishing House.
9. An Integrated Introduction to Computer Graphics and Geometric Modelling, R.Goldman, CRC Press, Taylor & Francis Group.
10. Computer Graphics, Rajesh K.Maurya, Wiley India.

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**15A05706      MACHINE LEARNING  
(CBCC-II)**

**Course Objectives:**

- To understand the basic theory underlying machine learning.
- 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 be able to apply machine learning algorithms to solve problems of moderate complexity.

**Course Outcomes:**

- Ability to understand what is learning and why it is essential to the design of intelligent machines.
- Ability to design and implement various machine learning algorithms in a wide range of real-world applications.
- Acquire knowledge deep learning and be able to implement deep learning models for language, vision, speech, decision making, and more

**Unit I:**

What is Machine Learning?, Examples of machine learning applications, supervised Learning: learning a class from examples, Vapnik- Chervonenkis dimension, probably approximately correct learning, noise, learning multiple classes, regression, model selection and generalization, dimensions of a supervised machine learning algorithm. Decision Tree Learning: Introduction, Decisions Tree representation, Appropriate problems for decision tree learning, the basic decision tree learning algorithm, Hypothesis space search in decision tree learning, Inductive bias in decision tree learning, issues in decision tree learning, Artificial Neural Networks: Introduction, Neural Network Representation – Problems – Perceptrons – Multilayer Networks and Back Propagation Algorithm, Remarks on the BACKPROPGRATION Algorithm, An illustrative Example: Face Recognition, Advanced Topics in Artificial Neural Networks.

**Unit 2:**

Evaluating Hypotheses: Motivation, Estimating hypothesis accuracy, basics of sampling theory, a general approach for deriving confidence intervals, differences in error of two hypothesis, comparing learning algorithms, Bayesian Learning: Introduction, Bayes Theorem, Bayes Theorem and Concept Learning, Maximum Likelihood and least

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squared error hypothesis, Maximum Likelihood hypothesis for predicting probabilities, Minimum Description Length Principle, Bayes Optimal Classifier, Gibbs Algorithm, Naïve Bayes Classifier, Bayesian Belief Network, EM Algorithm

**Unit 3:**

Dimensionality Reduction: Introduction, Subset selection, principle component analysis, feature embedding, factor analysis, singular value decomposition and matrix factorization, multidimensional scaling, linear discriminant analysis, canonical correlation analysis, Isomap, Locally linear embedding, laplacian eigenmaps, Clustering: Introduction, Mixture densities, K- Means clustering, Expectations-Maximization algorithm, Mixture of latent variable models, supervised learning after clustering, spectral clustering, Hierarchical clustering, Choosing the number of clusters, Nonparametric Methods: Introduction, Non Parametric density estimation, generalization to multivariate data, nonparametric classification, condensed nearest neighbor, Distance based classification, outlier detection, Nonparametric regression: smoothing models, how to choose the smoothing parameter

**Unit 4:**

Linear Discrimination: Introduction, Generalizing the linear model, geometry of the linear discrimination, pair wise separation, parametric discrimination revisited, gradient descent, logistic discrimination, discrimination by regression, learning to rank, Multilayer Perceptrons: Introduction, the perceptron, training a perceptron, learning Boolean functions, multilayer perceptrons, MLP as a universal approximator, Back propagation algorithm, Training procedures, Tuning the network size, Bayesian view of learning, dimensionality reduction, learning time, deep learning

**Unit 5:**

Kernel Machines: Introduction, Optimal separating hyperplane, the non separable case: Soft Margin Hyperplane,  $\nu$ -SVM, kernel Trick, Vectorial kernels, defining kernels, multiple kernel learning, multicast kernel machines, kernel machines for regression, kernel machines for ranking, one-class kernel machines, large margin nearest neighbor classifier, kernel dimensionality reduction, Graphical models: Introduction, Canonical cases for conditional independence, generative models, d separation, belief propagation, undirected Graphs: Markov Random files, Learning the structure of a graphical model, influence diagrams.

**Text Books:**

- 1) Machine Learning by Tom M. Mitchell, Mc Graw Hill Education, Indian Edition, 2016.
- 2) Introduction to Machine learning, Ethem Alpaydin, PHI, 3<sup>rd</sup> Edition, 2014

**References Books:**

- 1) Machine Learning: An Algorithmic Perspective, Stephen Marsland, Taylor & Francis, Page 167

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<b>15A05707</b>	<b>SOFTWARE PROJECT MANAGEMENT (CBC-III)</b>			

**Course Objectives:**

The main goal of software development projects is to create a software system with a predetermined functionality and quality in a given time frame and with given costs. For achieving this goal, models are required for determining target values and for continuously controlling these values. This course focuses on principles, techniques, methods & tools for model-based management of software projects, assurance of product quality and process adherence (quality assurance), as well as experience-based creation & improvement of models (process management). The goals of the course can be characterized as follows:

- Understanding the specific roles within a software organization as related to project and process management
- Describe the principles, techniques, methods & tools for model-based management of software projects, assurance of product quality and process adherence (quality assurance), as well as experience-based creation & improvement of models (process management).
- Understanding the basic infrastructure competences (e.g., process modeling and measurement)
- Understanding the basic steps of project planning, project management, quality assurance, and process management and their relationships

**Course Outcomes:**

- Describe and determine the purpose and importance of project management from the perspectives of planning, tracking and completion of project.
- Compare and differentiate organization structures and project structures
- Implement a project to manage project schedule, expenses and resources with the application of suitable project management tools

**UNIT I**

**Conventional Software Management:** The waterfall model, conventional software Management performance. Evolution of Software Economics: Software Economics, pragmatic software cost estimation

## **UNIT II**

**Improving Software Economics:** Reducing Software product size, improving software processes, improving team effectiveness, improving automation, Achieving required quality, peer inspections.

**The old way and the new:** The principles of conventional software engineering, principles of modern software management, transitioning to an iterative process

## **UNIT III**

**Life cycle phases:** Engineering and production stages, inception, Elaboration, construction, transition phases.

**Artifacts of the process:** The artifact sets, Management artifacts, Engineering artifacts, programmatic artifacts. Model based software architectures: A Management perspective and technical perspective.

## **UNIT IV**

**Work Flows of the process:** Software process workflows, Inter Trans workflows. Checkpoints of the Process: Major Mile Stones, Minor Milestones, Periodic status assessments. Iterative Process Planning: Work breakdown structures, planning guidelines, cost and schedule estimating, Interaction planning process, Pragmatic planning.

**Project Organizations and Responsibilities:** Line-of-Business Organizations, Project Organizations, evolution of Organizations.

**Process Automation:** Automation Building Blocks, The Project Environment

## **UNIT V**

**Project Control and Process instrumentation:** The server care Metrics, Management indicators, quality indicators, life cycle expectations pragmatic Software Metrics, Metrics automation. Tailoring the Process: Process discriminates, Example.

**Future Software Project Management:** Modern Project Profiles Next generation Software economics, modern Process transitions.

**Case Study:** The Command Center Processing and Display System-Replacement (CCPDS-R)

### **Text Books:**

1. Software Project Management, Walker Royce, Pearson Education.
2. Software Project Management, Bob Hughes & Mike Cotterell, fourth edition, Tata Mc-Graw Hill

**Reference Books :**

1. Applied Software Project Management, Andrew Stellman & Jennifer Greene, O'Reilly, 2006
2. Head First PMP, Jennifer Greene & Andrew Stellman, O'Reilly, 2007
3. Software Engineering Project Management, Richard H. Thayer & Edward Yourdon, second edition, Wiley India, 2004.
4. Agile Project Management, Jim Highsmith, Pearson education, 2004
5. The art of Project management, Scott Berkun, O'Reilly, 2005.
6. Software Project Management in Practice, Pankaj Jalote, Pearson Education, 2002

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**15A05708      DISTRIBUTED SYSTEMS  
(CBCC-III)**

**Course Objectives:**

The student should be made to:

- Understand the issues involved in studying process and resource management.
- Understand in detail the system level and support required for distributed system.
- Introduce the idea of peer to peer services and file system.
- Understand foundations of Distributed Systems.

**Course Outcomes:**

Student should be able to:

- Design process and resource management systems.
- Apply remote method invocation and objects.
- Apply network virtualization.
- Discuss trends in Distributed Systems.

**UNIT I****INTRODUCTION**

Examples of Distributed Systems – Trends in Distributed Systems – Focus on resource sharing – Challenges. Case study: World Wide Web.

**UNIT II****COMMUNICATION IN DISTRIBUTED SYSTEM**

System Model – Inter process Communication - the API for internet protocols – External data representation and Multicast communication. Network virtualization: Overlay networks. Case study: MPI Remote Method Invocation And Objects: Remote Invocation – Introduction - Request-reply protocols - Remote procedure call - Remote method invocation. Case study: Java RMI - Group communication - Publish-subscribe systems - Message queues - Shared memory approaches - Distributed objects - Case study: Enterprise Java Beans -from objects to components.

**UNIT III****PEER TO PEER SERVICES AND FILE SYSTEM**

Peer-to-peer Systems – Introduction - Napster and its legacy - Peer-to-peer – Middleware - Routing overlays. Overlay case studies: Pastry, Tapestry- Distributed File Systems –Introduction - File service architecture – Andrew File system. File System: Features-File model -File accessing models - File sharing semantics Naming: Identifiers, Addresses, Name Resolution – Name Space Implementation – Name Caches – LDAP.

**UNIT IV****SYNCHRONIZATION AND REPLICATION**

Introduction - Clocks, events and process states - Synchronizing physical clocks- Logical time and logical clocks - Global states – Coordination and Agreement – Introduction - Distributed mutual exclusion – Elections – Transactions and Concurrency Control– Transactions -Nested transactions – Locks – Optimistic concurrency control - Timestamp ordering – Atomic Commit protocols -Distributed deadlocks – Replication – Case study – Coda.

**UNIT V****PROCESS & RESOURCE MANAGEMENT**

Process Management: Process Migration: Features, Mechanism - Threads: Models, Issues, Implementation. Resource Management: Introduction- Features of Scheduling Algorithms –Task Assignment Approach – Load Balancing Approach – Load Sharing Approach.

**TEXT BOOK:**

1. George Coulouris, Jean Dollimore and Tim Kindberg, “Distributed Systems Concepts and Design”, Fifth Edition, Pearson Education, 2012.



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**15A05709 REAL TIME SYSTEMS  
(CBCC-III)**

**Course Objectives:**

- Acquire skills necessary to design and develop embedded applications by means of real-time operating systems
- Understand embedded real-time operating systems

**Course Outcomes:**

- Characterize real-time systems and describe their functions
- Analyze, design and implement a real-time system
- Apply formal methods to the analysis and design of real-time systems
- Apply formal methods for scheduling real-time systems
- Characterize and describe reliability and fault tolerance issues and approaches.

**Unit-1**

**Typical Real time Applications:** Digital control, High-level control, Signal processing, other Real-time Applications.

**Hard versus Soft Real-Time Systems:** Jobs and processors, Release time, dead lines and Timing constraints, Hard and soft timing constraints, Hard Real time systems, Soft Real-time Systems.

**A Reference Model of Real Time Systems:** Processors and resources, Temporal parameters of Real time workload, periodic task model, precedence constraints and data dependency, Functional parameter, Resource Parameters of Jobs and Parameters of Resources, Scheduling Hierarchy.

**Commonly used Approaches to real time Scheduling:** Clock-Driven Approach, Weighted Round-Robin Approach, Priority driven Approach, Dynamic vs Static Systems, Effective release time and deadlines, Optimality of the EDF and LST algorithms, Nonoptimality of the EDF and LST algorithms, Challenges in validating timing constraints in priority driven System, Off line vs On line scheduling, summary.

**Unit-2**

Clock-Driven Scheduling: Notations and Assumptions, static, Timer-Driven scheduler, General Structure of the Cyclic Scheduler, Improving the average response time of Aperiodic Jobs, Scheduling sporadic Jobs, Practical considerations and generalizations, Algorithm for generating Static Schedules, Pros and cons of Clock-driven scheduling, summary.

**Unit-3**

**Priority-Driven Scheduling of periodic Tasks :** Static Assumption, Fixed-priority vs Dynamic-priority Algorithms, Maximum Schedulable Utilization, Optimality of the RM and DM Algorithms, A Schedulability test for Fixed-priority tasks with Short Response time, A Schedulability test for Fixed-priority tasks with arbitrary Response time, Sufficient Schedulability conditions for the RM and DM Algorithms, summary.

**Unit-4**

**Scheduling Aperiodic and Sporadic Jobs in Priority Driven Systems:** Assumptions and approaches, Diferrable servers, Sporadic Servers, Constant utilization, total bandwidth and weighted fair –Queueing servers, Slack stealing in Dead-line Driven System, Stack stealing in Fixed-priority systems, Scheduling of sporadic jobs, Real-time performance for jobs with soft timing constraints, A two-level scheme for Integrated scheduling.

**Unit-5**

**Resources and Resource access control:** Assumptions on Resources and their usage, Effects of Resource contention and resource access control, Non Preemptive critical section, Basic Priority inheritance protocol, Basic Priority ceiling protocol, Stack –based, Priority ceiling protocol, Use of priority ceiling protocol in Dynamic priority systems, pre-emption ceiling protocol, Controlling accesses to Multiple unit Resources, Controlling concurrent accesses to data objects.

**Multiprocessor Scheduling, Resource access control, and Synchronization:** Model of Multiprocessor and Distributed Systems, Task assignment, Multiprocessor Priority ceiling protocol, Elements of Scheduling Algorithms for End-to-End Periodic Tasks, Schedulability of Fixed-priority End-to-End periodic Tasks, End to End tasks in heterogeneous Systems, Predictability and validation of Dynamic Multiprocessor Systems, Summary.

**Text Book:**

1. “Real-Time Systems” by Jane W.S Liu, Pearson Edition, 2006.

**Reference Text Book:**

1. Real-Time Systems: Scheduling, Analysis, and Verification, Cheng, A. M. K.: Wiley, 2002.
2. Z.: Scheduling in Real-Time Systems, by Cottet, F., Delacroix, J., Kaiser, C., Mammeri John Wiley & Sons, 2002.
3. Real-Time Systems, C. M., Shin, K. G. McGraw-Hill, Krishna 1997.

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**15A05710 GRID AND CLOUD COMPUTING LABORATORY**
**Course Objectives:**

- The student should be made to:
- Be familiar with developing web services/Applications in grid framework.
- Be exposed to tool kits for grid and cloud environment.
- Learn to use Hadoop
- Learn to run virtual machines of different configuration.

**Course Outcomes:**

The student should be able to  
 Design and Implement applications on the Cloud.  
 Design and implement applications on the Grid.  
 Use the grid and cloud tool kits.

**GRID COMPUTING PROGRAMS USING GRIDSIM**

- 1 Program to creates one Grid resource with three machines
  - 2 *Program to to create one or more Grid users. A Grid user contains one or more Gridlets*
  - 3 *Program to shows how two GridSim entities interact with each other ; main( ie example3 ) class creates Gridlets and sends them to the other GridSim entities, i.e. Test class*
  - 4 Program shows how a grid user submits its Gridlets or tasks to one grid resource entity
  - 5 Program to show how a grid user submits its Gridlets or task to many grid resource entities
  - 6 Program to show how to create one or more grid users and submits its Gridlets or task to many grid resource entities
  - 7 Program to creates one Grid resource with three machines
- Grid computing programs using Use Globus Toolkit or equivalent:***
- 1 Develop a new Web Service for Calculator.
  - 2 Develop new OGSA-compliant Web Service.
  - 3 Using Apache Axis develop a Grid Service.
  - 4 Develop applications using Java or C/C++ Grid APIs
  - 5 Develop secured applications using basic security mechanisms available in Globus Toolkit.

- 6 Develop a Grid portal, where user can submit a job and get the result. Implement it with and without GRAM concept.

### CLLOUD COMPUTING

#### Programs on SaaS

- 1 Create an word document of your class time table and store locally and on the cloud with doc,and pdf format . ( use [www.zoho.com](http://www.zoho.com) and [docs.google.com](https://docs.google.com))
- 2 Create a spread sheet which contains employee salary information and calculate gross and total sal using the formula  
 DA=10% OF BASIC  
 HRA=30% OF BASIC  
 PF=10% OF BASIC IF BASIC<=3000  
 12% OF BASIC IF BASIC>3000  
 TAX=10% OF BASIC IF BASIC<=1500  
 =11% OF BASIC IF BASIC>1500 AND BASIC<=2500  
 =12% OF BASIC IF BASIC>2500  
 ( use [www.zoho.com](http://www.zoho.com) and [docs.google.com](https://docs.google.com))  
 NET\_SALARY=BASIC\_SALARY+DA+HRA-PF-TAX
- 3 Prepare a ppt on cloud computing –introduction , models, services ,and architecture

***Ppt should contain explanations, images and at least 20 pages***

( use [www.zoho.com](http://www.zoho.com) and [docs.google.com](https://docs.google.com))

- 4 Create your resume in a neat format using google and zoho cloud

#### Programs on PaaS

- 1 Write a Google app engine program to generate n even numbers and deploy it to google cloud
- 2 Google app engine program multiply two matrices
- 3 Google app engine program to validate user ; create a database login(username, password) in mysql and deploy to cloud
- 4 Write a Google app engine program to display nth largest no from the given list of numbers and deploy it into google cloud
- 5 Google app engine program to validate the user Use mysql to store user info and deploy on to the cloud
- 6 Implement Prog 1-5 using Microsoft Azure

### CASE STUDY- cloud computing

<b>Sr. No.</b>	<b>Title of Experiment</b>	<b>Aim of the Experiment</b>	<b>Demonstration Equipments/ Components to be required</b>	<b>Type of Experiment/ Demonstration (Lab/Classroom)</b>
1	Case Study of Amazon	To understand the services of Amazon elastic cloud.	Computers with Internet Connection	Experiment: Student perform practical under supervision of faculty and Lab technician.
2	Case Study of Azure	To understand the services of Microsoft azure.	Computers with Internet Connection	Experiment: Student perform practical under supervision of faculty and Lab technician.
3	Case Study of Hadoop	To understand the services of hadoop.	Computers with Internet Connection	Experiment: Student perform practical under supervision of faculty and Lab technician.
4	Case Study of Aneka	To understand the services of aneka elastic cloud.	Computers with Internet Connection	Experiment: Student perform practical under supervision of faculty and Lab technician.
5	Case Study of Google Apps	To understand the services of google apps engine.	Computers with Internet Connection	Experiment: Student perform practical under supervision of

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6	Google apps business solution for data access and data upload	To understand the business solution application of Google apps.	Computers with Internet Connection	faculty and Lab technician.  Experiment: Student perform practical under supervision of faculty and Lab technician.
7	Control panel software manager Application of hypervisors	To understand the application of hypervisors.	Computers with Internet Connection	Experiment: Student perform practical under supervision of faculty and Lab technician.

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<b>B. Tech IV-I Sem. (CSE)</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	<b>0</b>	<b>0</b>	<b>4</b>	<b>2</b>

**15A05711 MOBILE APPLICATION DEVELOPMENT LABORATORY****Course Objectives:**

- To understand fundamentals of android operating systems.
- Illustrate the various components, layouts and views in creating android applications
- To understand fundamentals of android programming.

**Course Outcomes:**

- Create data sharing with different applications and sending and intercepting SMS.
- Develop applications using services and publishing android applications.
- To demonstrate their skills of using Android software development tools

**1. Setting Up the Development Environment****1.1 Download/Install the SDK**

For in-depth instructions, visit [Android Installation Documentation](#). Otherwise perform the following steps.

- Go to <http://developer.android.com/sdk/index.html>.
- Unpack to a convenient location - Remember the full path to this location, we will refer to it as `<android_sdk_dir>` for the rest of the lab.
  - `<android_sdk_dir>` would then be `/home/<username>/android_dir`.
- Add the path to the `<android_sdk_dir>/tools` directory to your system PATH
  - Windows:
    1. Right-click My Computer.
    2. Click Properties.
    3. Click Advanced tab.
    4. Click Environment Variables button.
    5. Double Click Path under System Variables.
    6. Add ; `<android_sdk_dir>/tools;<android_sdk_dir>/platform-tools` to the end of the Variable Values text field.
- Navigate to your `<android_sdk_dir>/tools` directory and type `android`. Add the appropriate components. See step 4 in <http://developer.android.com/sdk/installing.html>.
- Test your installation by running `adb` from the command line. If you did everything right, you should get a long list of help instructions.

## 1.2 Download/Install the Eclipse Plugin

- It is recommended that you use Eclipse 3.4 or later
  - Lab Machines - Fedora Eclipse based on 3.4.2  
The version of Eclipse used by the lab machines is missing a vital component and requires adding an additional Eclipse plugin in order to use the Android plugin:
    1. Click the menu Help -> Software Updates.
    2. Click the tab Available Software -> Add Site button.
    3. Enter <http://download.eclipse.org/releases/ganymede> into the Location field.
    4. Click OK button.
    5. Enter WST Common UI into the search/text box at the top of the window (give it a second, it tries to search as you type and its kind of slow).
    6. Click the checkbox next to WST Common UI.
    7. Click the Install button.
    8. Click the Next button.
    9. Accept the terms, click Finish.
    10. Restart Eclipse.
    11. Follow the steps in the next bullet 3.4 Ganymede.
  - Eclipse 3.4 Ganymede:
    1. Click the menu Help -> Software Updates.
    2. Click Available Software tab -> Add Site button.
    3. Enter <https://dl-ssl.google.com/android/eclipse> into the "Location" field.
    4. Click OK button.
    5. Click the checkbox next to Developer Tools.
    6. Click the Install button.
    7. Click the Next button.
    8. Accept the terms, click Finish.
    9. Restart Eclipse.
  - Eclipse 3.5 Galileo:
    1. Click Help -> Install New Software .
    2. Click Add... button.
    3. Enter a name for the site into the Name field.
    4. Enter <https://dl-ssl.google.com/android/eclipse/> into the Location field.
    5. Click OK button.
    6. Click the checkbox next to Developer Tools.
    7. Click the Next button.
    8. Accept the terms, click Finish.
    9. Restart Eclipse.



- Point Eclipse to <android\_sdk\_dir>:
  1. Click the menu Window -> Preferences.
  2. Click Android from the Hierarchy view on the left hand side.
  3. Enter <android\_sdk\_dir> into the SDK Location field.
  4. Click the Apply button.
  5. Click the OK button.

### 1.3 Download/Install the SDK Platform Components

At the time of writing this lab there are eight different versions of the Android Platform available, ranging from 1.1 to 2.2. It is best practice to develop for the oldest platform available that still provides the functionality you need. This way you can be assured that your application will be supported by as many devices as possible. However, you will still want to download newer versions of the platforms so that you can test your applications against these as well. Due to the size of each platform component you will only be required to download and develop on one platform for the whole class. We will target the highest platform that the G1 phones support, Android 1.6 (API 4). Before we can begin developing we must download and install this platform:

- Select the menu Window -> "Android SDK and AVD Manager", or click on the black phone shaped icon in the toolbar.
- Select Available Packages on the left hand side.
- Expand the Google Android site in the "Site, Packages, and Archives" Tree.
- Check the following items:
  - SDK Platform Android 1.6, API 4 Revision 3
  - Google APIs by Google Inc., Android API 4, Revision 2
  - *NOTE: Those of you developing on Lab Machines should follow these instructions: <http://sites.google.com/site/androidhowto/how-to-1/set-up-the-sdk-on-lab-machines-linux>.*
- Click Install Selected.
- Accept the Terms for all packages and click Install Accepted.

We're now ready to develop our application.

### 2. Create "Hello World" Application

- 2.1 Create a new Android Project
- 2.2 Run "Hello World" on the Emulator
- 2.3 On a Physical Device
- 2.4 Greeting the User

### 3. Create Application by Using Widgets

- 3.1 Creating the Application by using the Activity class
  - (i) onCreate()
  - (ii) onStart()
  - (iii) onResume()

- (iv) onPause()
  - (v) onStop()
  - (vi) onDestroy()
  - (vii) onRestart()
- 3.2 Creating the Application by using Text Edit control.
  - 3.3 Creating the Application Choosing Options
    - (i) CheckBox
    - (ii) RadioButton
    - (iii) RadioGroup
    - (iv) Spinner
- 4. Create Application by Using Building Blocks for Android Application Design
    - 4.1 Design the Application by using
      - (i) Linear Layout
      - (ii) Relative Layout
      - (iii) Absolute Layout
    - 4.2 Create the Application to play the Audio and Video clips.
- 5. Create Application by Using Building Menus and Storing Data
    - 5.1 Design the Application for Menus and Action Bar
      - 5.2 Design the application to display the Drop-Down List Action Bar

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	<b>3</b>	<b>1</b>	<b>0</b>	<b>3</b>

**15A05801 DATA ANALYTICS  
(MOOCS-II)****Course Objectives:**

- To introduce the terminology, technology and its applications
- To introduce the concept of Analytics for Business
- To introduce the tools, technologies & programming languages which is used in day to day analytics cycle

**Course Outcomes:**

- Ability to work with different data types.
- Ability to solve various problems related to businesses.
- Ability to effectively utilize the time and involve in collaborative tasks.

**Unit I****Introduction to Analytics and R programming (NOS 2101)**

Introduction to R, RStudio (GUI): R Windows Environment, introduction to various data types, Numeric, Character, date, data frame, array, matrix etc., Reading Datasets, Working with different file types .txt,.csv etc. Outliers, Combining Datasets, R Functions and loops. Summary Statistics - Summarizing data with R, Probability, Expected, Random, Bivariate Random variables, Probability distribution. Central Limit Theorem etc.

**Unit II****SQL using R & Correlation and Regression Analysis (NOS 2101)**

Introduction to NoSQL, Connecting R to NoSQL databases. Excel and R integration with R connector. Regression Analysis, Assumptions of OLS Regression, Regression Modelling. Correlation, ANOVA, Forecasting, Heteroscedasticity, Autocorrelation, Introduction to Multiple Regression etc.

**Unit III****Understand the Verticals - Engineering, Financial and others (NOS 2101)**

Understanding systems viz. Engineering Design, Manufacturing, Smart Utilities, Production lines, Automotive, Technology etc. Understanding Business problems related to various businesses

**Unit IV****Manage your work to meet requirements (NOS 9001)**

Understanding Learning objectives, Introduction to work & meeting requirements, Time Management, Work management & prioritization, Quality & Standards Adherence,

**Unit V****Work effectively with Colleagues (NOS 9002)**

Introduction to work effectively, Team Work, Professionalism, Effective Communication skills, etc. NOS \* National Occupational Standards

**Text Books:**

1. Student's Handbook for Associate Analytics.
2. Introduction to Scientific Programming and Simulation Using R, Owen Jones, Robert Maillardet and Andrew Robinson, Second Edition, CRC Press, 2014
3. A First Course in Statistical Programming with R, Braun W. J., Murdoch D. J.. — Cambridge University Press, 2007
4. Data Manipulation with R, Jaynal Abedin and Kishor Kumar Das, Second Edition, Packt publishing, BIRMINGHAM – MUMBAI.
5. Beginning R The Statistical Programming language- Mark Gardener, John Wiley & Sons, Inc, 2012

**Reference Books:**

1. Introduction to Probability and Statistics Using R, ISBN: 978-0-557-24979-4, is a textbook written for an undergraduate course in probability and statistics.
2. An Introduction to R, by Venables and Smith and the R Development Core Team. This may be downloaded for free from the R Project website (<http://www.r-project.org/>, see Manuals). There are plenty of other free references available from the R Project website.
3. Time Series Analysis and Mining with R, Yanchang Zhao
4. Graphics for Statistics and Data Analysis with R – Kevin J. Keen, CRC Press, 2010
5. Data Analysis and Graphics Using R, Third Edition, John Maindonald, W. John Braun, Cambridge University Press, 2010
6. Exploratory Data Analysis with R – Roger D. Peng, Leanpub publications, 2015
7. Introduction to Probability and Statistics Using R, G. Jay Kerns, First Edition, 2011
8. The Art of Data Science- A Guide for anyone Who Works with Data – Roger D. Peng and Elizabeth Matsui, Leanpub Publications, 2014
9. Montgomery, Douglas C., and George C. Runger, Applied statistics and probability for

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engineers. John Wiley & Sons, 2010. The Basic Concepts of Time Series Analysis.  
<http://anson.ucdavis.edu/~azari/sta137/AuNotes.pdf>

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<b>B. Tech IV-II Sem. (CSE)</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	<b>3</b>	<b>1</b>	<b>0</b>	<b>3</b>

**15A05802 MOBILE COMPUTING  
(MOOCS-II)****Course Objectives:**

- Understand mobile ad hoc networks, design and implementation issues, and available solutions.
- Acquire knowledge of sensor networks and their characteristics.

**Course Outcomes:**

- Students able to use mobile computing more effectively
- Students gain understanding of the current topics in MANETs and WSNs, both from an industry and research point of views.
- Acquire skills to design and implement a basic mobile ad hoc or wireless sensor network via simulations.

**UNIT-I:**

**Wireless LANS and PANS:** Introduction, Fundamentals of WLANS, IEEE 802.11 Standards, HIPERLAN Standard, Bluetooth, Home RF.

**Wireless Internet:**

Wireless Internet, Mobile IP, TCP in Wireless Domain, WAP, Optimizing Web over Wireless.

**UNIT-II:**

**AD HOC Wireless Networks:** Introduction, Issues in Ad Hoc Wireless Networks, AD Hoc Wireless Internet.

**MAC Protocols for Ad Hoc Wireless Networks:** Introduction, Issues in Designing a MAC protocol for Ad Hoc Wireless Networks, Design goals of a MAC Protocol for Ad Hoc Wireless Networks, Classifications of MAC Protocols, Contention - Based Protocols, Contention - Based Protocols with reservation Mechanisms, Contention – Based MAC Protocols with Scheduling Mechanisms, MAC Protocols that use Directional Antennas, Other MAC Protocols.

**UNIT -III:**

**Routing Protocols:** Introduction, Issues in Designing a Routing Protocol for Ad Hoc Wireless Networks, Classification of Routing Protocols, Table –Driven Routing Protocols, On – Demand

Routing Protocols, Hybrid Routing Protocols, Routing Protocols with Efficient Flooding Mechanisms, Hierarchical Routing Protocols, Power – Aware Routing Protocols.

**Transport Layer and Security Protocols:** Introduction, Issues in Designing a Transport Layer Protocol for Ad Hoc Wireless Networks, Design Goals of a Transport Layer Protocol for Ad Hoc Wireless Networks, Classification of Transport Layer Solutions, TCP Over Ad Hoc Wireless Networks, Other Transport Layer Protocol for Ad Hoc Wireless Networks, Security in Ad Hoc Wireless Networks, Network Security Requirements, Issues and Challenges in Security Provisioning, Network Security Attacks, Key Management, Secure Routing in Ad Hoc Wireless Networks.

#### **UNIT –IV:**

**Quality of Service:** Introduction, Issues and Challenges in Providing QoS in Ad Hoc Wireless Networks, Classification of QoS Solutions, MAC Layer Solutions, Network Layer Solutions, QoS Frameworks for Ad Hoc Wireless Networks.

**Energy Management:** Introduction, Need for Energy Management in Ad Hoc Wireless Networks, Classification of Ad Hoc Wireless Networks, Battery Management Schemes, Transmission Power Management Schemes, System Power Management Schemes.

#### **UNIT –V:**

**Wireless Sensor Networks:** Introduction, Sensor Network Architecture, Data Dissemination, Data Gathering, MAC Protocols for Sensor Networks, Location Discovery, Quality of a Sensor Network, Evolving Standards, Other Issues.

#### **TEXT BOOKS:**

1. Ad Hoc Wireless Networks: Architectures and Protocols - C. Siva Ram Murthy and B.S.Manoj, PHI, 2004.
2. Wireless Ad- hoc and Sensor Networks: Protocols, Performance and Control - Jagannathan Sarangapani, CRC Press

#### **REFERENCE BOOKS:**

1. Ad hoc Mobile Wireless Networks – Subir Kumar sarkar, T G Basvaraju, C Puttamadappa, Auerbach Publications,2012.
2. Wireless Sensor Networks - C. S. Raghavendra, Krishna M. Sivalingam, 2004, Springer.
3. Ad- Hoc Mobile Wireless Networks: Protocols & Systems, C.K. Toh , Pearson Education.

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	L	T	P	C
B. Tech IV-II Sem. (CSE)	3	1	0	3

**15A05803 INNOVATIONS AND IT MANAGEMENT  
(MOOCS-II)**

**Course Objectives:**

- Understand the role of information technology in businesses, in state or central government departments and in remote parts of India.
- Understand the future of information systems and the manner in which they are shaping the world around us.
- Understand the Ethical and Social issues concerning information systems.

**Course Outcomes:**

- Ability to do Business over the Internet.
- Ability to solve Business problems by applying analytics.
- Ability to use ICT to participate in Democratic process.

**Unit-1:**

**Organisations and Information Systems:** Modern organization, Information systems in organisations, The role of Internet, , Managing in the Internet Era, Managing Information Systems in Organisations, Challenges for the Manager. **Concepts of MIS:** Data and information, Information as a Resource, Information in Organisational Functions, Types of Information Technology, Types of Information Systems, Decision Making with MIS, Communication in Organisations. **Information systems and Management Strategy:** The Competitive environment of Business, Using IT for Competing, Information goods, Information systems and competitive Strategy.

**Unit- 2:**E-Commerce technology, HTML and E-mail, Business over the Internet, E-Business, E-Governance. **Managing Information Systems:** Challenges of managing the IT Function, Vendor Management, The role of CIO, Ethical Issues, and Social Issues.

**Unit- 3: Infrastructure of IT:** What is IT Infrastructure, IT infrastructure Decisions, Infrastructure components, networks, solutions, cloud computing, Virtualization, Enterprise systems, IT Outsourcing, Networks in organisation and what has to be managed. **Information systems security and control:** Threats to the organization, Technologies for handling security, managing security.



**Unit- 4:** Analysis of Business Process, Business Process Integration, Motivation for Enterprise systems (ES), Supply chain management systems, Customer Relationship Management systems, Challenges for ES implementations, International Information systems, Decision support systems (DSS), Components of DSS, Analytical and Business Intelligence, Knowledge Management.

**Unit-5:** ICT Development, Types of ICT interventions, Examples, E-Governance concepts, E-Government, E-Participation, Social Dynamics of the internet, Services of the Internet, Technology of the Internet, Social Issues, Social networks in the Enterprise, concept of open source software, open source licences, open source in business and Government, open Data Standards and the open community.

**Text book:**

1. "MIS: Managing information Systems and in Business, Government and Society" Rahul De, Wiley publications.

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	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>B. Tech IV-II Sem. (CSE)</b>	<b>3</b>	<b>1</b>	<b>0</b>	<b>3</b>

**15A05804 BUILDING LARGE SCALE SOFTWARE SYSTEMS  
(MOOCS-III)**

**Course Objectives:**

- To introduce the architecture of large c programs.
- To introduce the concept Case study for design of large C programs using Linux kernel.
- To introduce the tools, technologies & programming languages.

**Course Outcomes:**

- Student able to understand coupling and cohesion
- Student able to design large c and c++ programs using Linux kernel
- Student able to understand how to design Linux kernel
- Ability to solve various problems related to Object Oriented Software using patterns

**Unit I:** Architecture of Large C Programs : Coupling and Cohesion concepts , types of cohesion functional, sequential, procedural, temporal, logical and coincidental; types of coupling – data,stamp, control, common, content coupling.

**Unit II:** Designing Large C programs having good cohesion and coupling; C modules- notation of separate compilation; Case study for design of large C programs using linux kernel.

**Unit III:** Tools for building large programs – version control using git and building large programs using make – bug tracking systems – bugzilla.

**Unit IV:** Building Large C++ programs – Architecture of Large C ++ programs – Coupling and Cohesion of C++ programs, Metrics for measuring the quality of C++ programs, Chidamber and Krammer. Metric suite- MOOD metrics – improving the design of C++ programs; Case study of redesigning Linux kernel into Minimalistic Object Oriented Linux (MOOL).

**Unit V:** Pattern Oriented Software Architecture: Building object oriented programs using design patterns identification of design patterns in source code- refactoring existing programs into design pattern based programs- case studies of building software with design patterns.

**Text Books:**

1. D. Janakiram, "Building Large Scale Software Systems", McGraw Hill Education, 2013.
2. John Lakos , "Large-Scale C++ Software Design", Addison Wesley, 1996.

**References:**

1. Scott W. Ambler, Barbara Hanscome, "Process Patterns: Building Large-Scale Systems Using Object Technology", 1st Edition, Cambridge University Press, 1998.
2. Peter van der Linden, "Expert C Programming: Deep C Secrets 1st Edition", Prentice Hall.
3. Andrei Alexandrescu, "Modern C++ Design: Generic Programming and Design Patterns Applied", 1st Edition, Addison Wesley, 2011.

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	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>B. Tech IV-II Sem. (CSE)</b>	<b>3</b>	<b>1</b>	<b>0</b>	<b>3</b>

**15A05805                      ENABLING TECHNOLOGIES FOR DATA SCIENCE  
& ANALYTICS: IoT**

**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.

**Course Outcomes:**

- Able to understand the application areas of IoT
- Able to realize the revolution of Internet in Mobile Devices, Cloud & Sensor Networks
- Able to understand building blocks of Internet of Things and characteristics.

**UNIT I: Introduction to Internet of Things**

Introduction, Physical Design of IoT, Logical Design of IoT, IoT Enabling Technologies.

**Domain Specific IoTs**

Introduction, Home Automation, cities, Environment, Retail, Agriculture, Industry, Health & Lifestyle.

**UNIT II:****IoT and M2M**

Introduction, M2M, Difference between IoT and M2M, SDN and NFV for IoT.

**IoT System Management with NETCONF-YANG**

Need for IoT Systems Management, Simple Network Management Protocol (SNMP), Network Operator requirements, NETCONF, YANG, IoT System Management with NETCONF-YANG.

**UNIT III: Developing Internet of Things**

Introduction, IoT Design Methodology, Case Study on IoT System for Weather Monitoring.

**Case Studies Illustrating IoT Design:**

Introduction, Home Automation, Cities, Environment, Agriculture, Productivity Applications.

**UNIT IV****Advanced Topics:**

Introduction, Apache Hadoop, Using Hadoop Map Reduce for Batch Data Analysis.

**IEEE 802.15.4:**

The IEEE 802 committee family of protocols, The physical layer, The Media Access control layer, Uses of 802.15.4, The Future of 802.15.4: 802.15.4e and 802.15.4g.

**UNIT V:****ZigBee:**

Development of the standard, ZigBee Architecture, Association, The ZigBee network layer, The ZigBee APS Layer, The ZigBee Devices Object (ZDO) and the ZigBee Device Profile (ZDP), Zigbee Security, The ZigBee Cluster Library (ZCL), ZigBee Applications profiles, The ZigBee Gateway Specifications for network devices.

**TEXT BOOKS:**

1. Internet of Things a Hands-on Approach by Arshdeep Bahga and Vijay Madisetti. University Press.
2. The Internet of Things key applications and protocols by Oliver Hersent, David Boswarthick and Omar elloumi, Wiley Student Edition.

**REFERENCE BOOKS:**

1. Internet of Things: Architecture, Design Principles and Applications by Raj Kamal MCGraw Hill Edition.

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<b>B. Tech IV-II Sem. (CSE)</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	<b>3</b>	<b>1</b>	<b>0</b>	<b>3</b>

**15A05806 CYBER SECURITY  
(MOOCS-III)**

**Course Objectives:**

- Appraise the current structure of cyber security roles across the DoD enterprise, including the roles and responsibilities of the relevant organizations.
- Evaluate the trends and patterns that will determine the future state of cyber security

**Course Out comes:**

- Analyze threats and risks within context of the cyber security architecture
- Appraise cyber security incidents to apply appropriate response
- Evaluate decision making outcomes of cyber security scenarios

**Unit-I**

Cyber crime: Mobile and Wireless devices-Trend mobility-authentication service security-Attacks on mobile phones-mobile phone security Implications for organizations-Organizational measurement for Handling mobile-Security policies and measures in mobile computing era. Cases.

**Unit-II**

Tools and methods used in cyber crime-Proxy servers and Anonymizers-Phishing>Password cracking-Key loggers and Spy wares-Virus and worms-Trojan Horse and Backdoors-Steganography-SQL Injection-Buffer overflow-Attacks on wireless network. Cases.

**Unit-III**

Understanding computer forensic-Historical background of cyber forensicForensic analysis of e-mail-Digital forensic life cycle-Network forensic-Setting up a computer forensic Laboratory-Relevance of the OSI 7 Layer model to computer Forensic-Computer forensic from compliance perspectives. Cases.

**Unit-IV**

Forensic of Hand –Held Devices-Understanding cell phone working characteristics-Hand-Held devices and digital forensic- Toolkits for Hand-Held device-Forensic of i-pod and digital music devices-Techno legal Challenges with evidence from hand-held Devices. Cases.

**Unit-V**

Cyber Security –Organizational implications-cost of cybercrimes and IPR issues Web threats for organizations: the evils and Perils-Social media marketing Security and privacy Implications-Protecting people privacy in the organizations Forensic best practices for organizations. Cases.

**Text book:**

1. Nina Godbole & Sunit Belapure “Cyber Security”, Wiley India, 2012.

**REFERENCES:**

1. Harish Chander, “cyber laws & IT protection”, PHI learning pvt.ltd, 2012.
2. Dhiren R Patel, “Information security theory & practice”,PHI learning pvt ltd,2010.
3. MS.M.K.Geetha & Ms.Swapne Raman”Cyber Crimes and Fraud Management, ”MACMILLAN,2012. Pankaj Agarwal : Information Security& Cyber Laws (Acme Learning), Excel, 2013.
4. Vivek Sood, Cyber Law Simplified, TMH, 2012.



# **Jawaharlal Nehru Technological University Anantapur**

*(Established by Govt. of A.P., Act. No. 30 of 2008)*

**Ananthapuramu–515 002 (A.P) India**

## **B.Tech. in Computer Science & Engineering Course Structure and Syllabi under R19 Regulations**



<b>JNTUA Curriculum</b>
<b>Computer Science &amp; Engineering B. Tech Course Structure</b>

<b>S.No.</b>	<b>Course Name</b>	<b>Category</b>	<b>L-T-P-C</b>
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	2-0-3-0
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>Semester - I (Theory - 3, Lab - 4)</b>					
<b>S.No</b>	<b>Course No</b>	<b>Course Name</b>	<b>Category</b>	<b>L-T-P</b>	<b>Credits</b>
1.	19A54101	Algebra and Calculus	BS	3-1-0	4
2.	19A51102T	Chemistry	BS	3-0-0	3
3.	19A05101T	Problem Solving & Programming	ES	3-1-0	4
4.	19A03102	Engineering Graphics Lab	ES	1-0-4	3
5.	19A03101	Engineering Workshop	LC	0-0-2	1
6.	19A51102P	Chemistry Lab	BS	0-0-3	1.5
7.	19A05101P	Problem Solving & Programming Lab	ES	0-0-3	1.5
<b>Total</b>					<b>18</b>

<b>Semester - II (Theory - 5, Lab - 5)</b>					
<b>S.No</b>	<b>Course No</b>	<b>Course Name</b>	<b>Category</b>	<b>L-T-P</b>	<b>Credits</b>
1.	19A02201T	Basic Electrical and Electronics Engineering	ES	3-0-0	3
2.	19A54202	Probability and Statistics	BS	3-1-0	4
3.	19A56101T	Applied Physics	BS	3-0-0	3
4.	19A05201T	Data Structures	ES	3-0-0	3
5.	19A52101T	Communicative English - I	HS	2-0-0	2
6.	19A05202	Computer Science and Engineering Workshop	LC	0-0-2	1
7.	19A52101P	Communicative English - I Lab	HS	0-0-2	1
8.	19A02201P	Basic Electrical & Electronics Engineering Lab	ES	0-0-3	1.5
9.	19A56101P	Applied Physics Lab	BS	0-0-3	1.5
10.	19A05201P	Data Structures Lab	ES	0-0-3	1.5
<b>Total</b>					<b>21.5</b>

<b>Semester – III (Theory - 7, Lab – 3, MC-1)</b>					
<b>S.No</b>	<b>Course No</b>	<b>Course Name</b>	<b>Category</b>	<b>L-T-P</b>	<b>Credits</b>
1.	19A54303	Mathematical Foundations of Computer Science	BS	3-0-0	3
2.	19A05301	Digital Logic Design	PC	3-0-0	3
3.	19A99304	Design Thinking	ES	2-0-0	2
4.	19A05302T	Database Management Systems	PC	3-0-0	3
5.	19A05303T	Object Oriented Programming Through Java	PC	3-0-0	3
6.	19A05304T	Python Programming	PC	2-1-0	3
7.	19A52301	Universal Human Values	HS	2-0-0	2
8.	19A05302P	Database Management Systems Lab	PC	0-0-3	1.5
9.	19A05303P	Object Oriented Programming Through Java Lab	PC	0-0-3	1.5
10.	19A05304P	Python Programming Lab	PC	0-0-3	1.5
11.	19A99301	Environmental Science	MC	3-0-0	0
				<b>Total</b>	<b>23.5</b>

<b>Semester - IV (Theory - 6, Lab – 2, MC-1)</b>					
<b>S.No</b>	<b>Course No</b>	<b>Course Name</b>	<b>Category</b>	<b>L-T-P</b>	<b>Credits</b>
1.	19A54401	Number Theory and Applications	BS	3-0-0	3
2.	19A05401	Computer Organization	PC	3-0-0	3
3.	19A05402T	Design and Analysis of Algorithms	PC	3-0-0	3
4.	19A52401	Entrepreneurship	HS	3-0-0	3
5.	19A05403T	Operating Systems	PC	3-0-0	3
6.	19A05404T	Software Engineering	PC	3-0-0	3
7.	19A05403P	Operating Systems Lab	PC	0-0-3	1.5
8.	19A05404P	Software Engineering Lab	PC	0-0-3	1.5
9.	19A99302	Biology For Engineers	MC	3-0-0	0
				<b>Total</b>	<b>21</b>

<b>Semester – V (Theory - 6, Lab - 3)</b>					
<b>S.No.</b>	<b>Course No</b>	<b>Course Name</b>	<b>Category</b>	<b>L-T-P</b>	<b>Credits</b>
<b>1.</b>	19A05501	Formal Languages and Automata Theory	PC	3-0-0	3
<b>2.</b>	19A05502T	Artificial Intelligence	PC	3-0-0	3
<b>3.</b>	19A05503T	Object Oriented Analysis Design & Testing	PC	2-0-0	2
<b>4.</b>	19A05504T	Computer Networks	PCC	3-0-0	3
<b>5.</b>	19A05505a 19A05505b 19A05505c	Professional Elective-I Data warehousing and Data mining Web Technologies Mobile Application Development	PE	3-0-0	3
<b>6.</b>	19A01506a 19A01506b 19A02506a 19A03506a  19A03506b 19A04506a 19A04506b 19A27506a 19A27506b  19A54506a 19A52506a  19A51506a	Open Elective-I Experimental stress analysis. Building Technology Electrical Engineering Materials Introduction to Hybrid and Electric Vehicles  Rapid Prototyping Analog Electronics Digital Electronics Brewing Technology Computer Applications in Food Technology  Optimization Techniques Technical Communication and Presentation Skills  Chemistry of Energy Materials	OE	3-0-0	3
<b>7.</b>	19A05502P	Artificial Intelligence Laboratory	PCC	0-0-3	1.5
<b>8.</b>	19A05504P	Computer Networks Laboratory	PCC	0-0-3	1.5
<b>9.</b>	19A05503T	Object Oriented Analysis Design & Testing Lab	PCC	0-0-2	1.0
<b>10.</b>	19A05507	Socially Relevant Project	PR	-----	0.5
<b>11.</b>	19A99501	Mandatory course: Constitution of India	MC	3-0-0	0
				<b>Total</b>	<b>21.5</b>

Semester – VI (Theory - 6, Lab - 2)					
S.No.	Course No	Course Name	Category	L-T-P	Credits
1.	19A05601	Cryptography & Network Security	PC	2-1-0	3
2.	19A05602T	Big Data Analytics	PCC	3-0-0	3
3.	19A52601T	English Communication	HS	3-0-0	3
4.	19A05603a 19A05603b 19A05603c 19A05603d 19A05603e	Professional Elective-II (MOOCS) Compiler Design Introduction to Machine Learning Real Time Systems Advance Computer Architecture Computer Vision	PE	3-0-0	3
5.	19A01604a 19A01604b 19A02604a 19A02604b 19A03604a 19A03604b 19A04604a 19A04604b 19A27604a 19A27604b 19A54604a 19A52604a 19A51604a	Open Elective-II Industrial waste and wastewater management Building Services & Maintenance Industrial Automation System Reliability Concepts Introduction to Mechatronics Optimization techniques through MATLAB Basics of VLSI Principles of Communication Systems Food Toxicology Food Plant Equipment Design Wavelet Transforms & its applications Soft Skills Chemistry of Polymers and Its Applications	OE	3-0-0	3
6.	19A52602a 19A52602b 19A52602c 19A52602d 19A52602e	Humanities Elective-I Entrepreneurship & Incubation Managerial Economics and Financial Analysis Business Ethics and Corporate Governance Enterprise Resource Planning Supply Chain Management	HE	3-0-0	3
7.	19A05602P	Big Data Analytics Laboratory	PCC	0-0-3	1.5
8.	19A52601P	English Communication lab	HS	0-0-3	1.5
9.	19A05605	Socially Relevant Project	PR	-----	0.5
10.	19A99601	Mandatory Course: Research Methodology	MC	3-0-0	0
11.	19A05606	Comprehensive online examination		-	0
				<b>Total</b>	<b>21.5</b>

<b>Semester – VII (Theory - 5, Lab -2)</b>					
<b>S.No.</b>	<b>Course No</b>	<b>Course Name</b>	<b>Category</b>	<b>L-T-P</b>	<b>Credits</b>
<b>1.</b>	19A05701T	Internet of Things	PC	2-1-0	3
<b>2.</b>	19A05702T	Software Testing	PC	2-1-0	3
<b>3.</b>	19A05703a 19A05703b 19A05703c	Professional Elective-III Cloud Computing Natural Language Processing Agile Methodologies	PE	3-0-0	3
<b>4.</b>	19A01704a 19A01704b 19A02704a 19A02704b 19A03704a 19A03704b 19A04704a  19A04704b 19A27704a 19A27704b  19A54704a  19A51704a	Open Elective-III Air pollution and control. Basics of civil Engineering Renewable Energy Systems Electric Vehicle Engineering Finite element methods Product Marketing Introduction to Microcontrollers & Applications Principles of Digital Signal Processing Corporate Governance in Food Industries Process Technology for Convenience & RTE Foods Numerical Methods for Engineers (ECE, CSE, IT & CE) Chemistry of Nanomaterials and Applications	OE	3-0-0	3
<b>5.</b>	19A52701a 19A52701b 19A52701c 19A52701d 19A52701e	Humanities Elective-II Organizational Behavior Management Science Business Environment Strategic Management E-Business	HS	3-0-0	3
<b>6.</b>	19A05702P	Software Testing Lab	PC	0-0-3	1.5
<b>7.</b>	19A05701P	Internet of Things Lab	PC	0-0-3	1.5
<b>8.</b>	19A05705	Industrial Training/Skill Development/Research Project*	PR	-----	2
				<b>Total</b>	<b>20</b>

<b>Semester – VIII (Theory - 2)</b>					
<b>S.No.</b>	<b>Course No</b>	<b>Course Name</b>	<b>Category</b>	<b>L-T-P</b>	<b>Credits</b>
<b>1.</b>	19A05801a 19A05801b 19A05801c	Professional Elective-IV Dev Ops Deep Learning Adhoc & Sensor Networks	PE	3-0-0	3
<b>2.</b>	19A01802a 19A01802b 19A02802a 19A02802b 19A03802a 19A03802b 19A04802a 19A04802b 19A04802c 19A04802d 19A27802a 19A27802b 19A54802a 19A51802a	Open Elective-IV Disaster Management. Global Warming and climate changes IoT Applications in Electrical Engineering Smart Electric Grid Energy conservation and management Non - destructive testing Introduction to Image Processing Principles of Cellular and Mobile Communications Industrial Electronics Electronic Instrumentation Food Plants Utilities & Services Nutraceuticals & Functional Foods Mathematical Modeling & Simulation Green Chemistry and Catalysis for Sustainable Environment	OE	3-0-0	
<b>3.</b>	19A05803	Project	PR	-----	7
				<b>Total</b>	<b>13</b>

### Honours Degree in CSE

S.No.	Course No.	Course Name	L	T	P	Credits
1.	19A05H01	Secure Software Engineering	3	0	0	4
2.	19A05H02	Multicore Architecture & Programming	3	0	0	4
3.	19A05H03	Reinforcement Learning	3	0	0	4
4.	19A05H04	Trusted Network Systems	3	0	0	4
5.	19A05H05	Parallel Database Systems	3	0	0	4
					<b>Total</b>	<b>20</b>

### Minor Degree in CSE

S.No.	Course No.	Course Name	L	T	P	Credits
1.	19A05402T	Design and Analysis of Algorithms	3	0	0	3
2.	19A05302T	Database Management Systems	3	0	0	3
3.	19A05404T	Software Engineering	3	0	0	3
4.	19A05403T	Operating Systems	3	0	0	3
5.	19A05502T	Artificial Intelligence	3	0	0	3
6.	19A05M01	Mini Project				5
					<b>Total</b>	<b>20</b>



**(19A54101) ALGEBRA & CALCULUS**  
(Common to all branches of Engineering)

**Course Objectives:**

- This course will illuminate the students in the concepts of calculus and linear algebra.
- 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.

**Bridge Course:** Limits, continuity, Types of matrices

**Unit 1:Matrices**

**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, diagonalisation of a matrix, quadratic forms and nature of the quadratic forms, reduction of quadratic form to canonical forms by orthogonal transformation.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- solving systems of linear equations, using technology to facilitate row reduction determine the rank, eigenvalues and eigenvectors, diagonal form and different factorizations of a matrix; (L3)
- identify special properties of a matrix, such as positive definite, etc., and use this information to facilitate the calculation of matrix characteristics; (L3)

**Unit 2: Mean Value Theorems**

**6 hrs**

Rolle's Theorem, Lagrange's mean value theorem, Cauchy's mean value theorem, Taylor's and Maclaurin theorems with remainders (without proof);

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Translate the given function as series of Taylor's and Maclaurin's with remainders (L3)
- analyze the behaviour of functions by using mean value theorems (L3)

**Unit 3: Multivariable calculus**

**8 hrs**

Partial derivatives, total derivatives, chain rule, change of variables, Jacobians, maxima and minima of functions of two variables, method of Lagrange multipliers.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Find partial derivatives numerically and symbolically and use them to analyze and interpret the way a function varies. (L3)
- Acquire the Knowledge maxima and minima of functions of several variable (L1)
- Utilize Jacobian of a coordinate transformation to deal with the problems in change of variables (L3)

#### **Unit 4: Multiple Integrals**

**10hrs**

Double integrals, change of order of integration, double integration in polar coordinates, areas enclosed by plane curves. Evaluation of triple integrals, change of variables between Cartesian, cylindrical and spherical polar co-ordinates.

#### **Learning Outcomes:**

- At the end of this unit, the student will be able to
- Evaluate double integrals of functions of several variables in two dimensions using Cartesian and polar coordinates (L5)
- Apply double integration techniques in evaluating areas bounded by region (L4)
- Evaluate multiple integrals in Cartesian, cylindrical and spherical geometries (L5)

#### **Unit 5: Special Functions**

**6 hrs**

Beta and Gamma functions and their properties, relation between beta and gamma functions, evaluation of definite integrals using beta and gamma functions.

#### **Learning Outcomes:**

At the end of this unit, the student will be able to

- understand beta and gamma functions and its relations (L2)
- Conclude the use of special function in evaluating definite integrals (L4)

#### **Text Books:**

1. Erwin Kreyszig, Advanced Engineering Mathematics, 10/e, John Wiley & Sons, 2011.
2. B. S. Grewal, Higher Engineering Mathematics, 44/e, Khanna Publishers, 2017.

#### **Reference Books:**

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.
4. Micheael Greenberg, Advanced Engineering Mathematics, 9<sup>th</sup> edition, Pearson edn
5. Dean G. Duffy, Advanced engineering mathematics with MATLAB, CRC Press
6. Peter O'neil, Advanced Engineering Mathematics, Cengage Learning.
7. R.L. Garg Nishu Gupta, Engineering Mathematics Volumes-I &II, Pearson Education
8. B. V. Ramana, Higher Engineering Mathematics, Mc Graw Hill Education
9. H. k Das, Er. Rajnish Verma, Higher Engineering Mathematics, S. Chand.

10. N. Bali, M. Goyal, C. Watkins, Advanced Engineering Mathematics, Infinity Science Press.

**Course Outcomes:**

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

- develop the use of matrix algebra techniques that is needed by engineers for practical applications (L6)
- Utilize mean value theorems to real life problems (L3)
- familiarize with functions of several variables which is useful in optimization (L3)
- Students will also learn important tools of calculus in higher dimensions. Students will become familiar with 2- dimensional coordinate systems (L5)
- Students will become familiar with 3- dimensional coordinate systems and also learn the utilization of special functions

(19A51102T) CHEMISTRY  
(CSE, CSSE, ECE, EIE, EEE and IT)

**Course Objectives:**

- To familiarize engineering chemistry and its applications
- To train the students on the principles and applications of electrochemistry and polymers
- To introduce instrumental methods, molecular machines and switches

**Unit 1: Structure and Bonding Models:**

(10 hrs)

Planck's quantum theory, dual nature of matter, Schrodinger equation, significance of  $\Psi$  and  $\Psi^2$ , 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.  $\pi$ -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.

**Learning Outcomes:**

*At the end of this unit, the students will be able to*

- **apply** Schrodinger wave equation to hydrogen and particle in a box (L3)
- **illustrate** the molecular orbital energy level diagram of different molecular species (L2)
- **explain** the band theory of solids for conductors, semiconductors and insulators (L2)
- **discuss** the magnetic behaviour and colour of complexes (L3)

**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-air battery, Fuel cells, hydrogen-oxygen, methanol fuel cells – working of the cells.

Secondary cells – lead acid, and lithium ion batteries- working of the batteries including cell reactions.

**Learning Outcomes:**

*At the end of this unit, the students will be able to*

- **apply** Nernst equation for calculating electrode and cell potentials (L3)
- **differentiate** between pH metry, potentiometric and conductometric titrations (L2)
- **explain** the theory of construction of battery and fuel cells (L2)

- solve problems based on cell potential (L3)

### 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, urea-formaldehyde, Nylon-66, carbon fibres, 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)
- **explain** the preparation, properties and applications of Bakelite, Nylon-66, 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 4: Instrumental Methods and Applications

(10 hrs)

Electromagnetic spectrum. Absorption of radiation: Beer-Lambert's law. Principle and applications of pH metry, potentiometry, conductometry, UV-Visible, IR and NMR Spectroscopies. Principles of Gas Chromatography (GC) and High Performance Liquid Chromatography (HPLC), separation of gaseous mixtures and liquid mixtures

#### Learning outcomes:

After completion of Module IV, students will be able to

- **explain** the different types of spectral series in electromagnetic spectrum (L2)
- **understand** the principles of different analytical instruments (L2)
- **explain** the different applications of analytical instruments (L2)

### Unit 5: Molecular Machines and Molecular Switches:

(10 hrs)

Concepts and terms of supra molecular chemistry, complementarity, Basic Lock and Key principle, examples of Supramolecules, Molecular recognition- cation binding, anion binding, simultaneous cation and anion binding, supramolecular reactivity and catalysis

Self assembly in biological systems, Synthetic systems- catenanes, rotaxanes, metal ion assisted assemblies, template synthesis of macrocyclic ligands

Applications of Supramolecular Devices- Ionic devices, Electronic devices, Switching devices

#### Learning Outcomes:

*At the end of this unit, the students will be able to*

- **explain** the band theory of solids for conductors, semiconductors and insulators (L2)
- **explains** supramolecular chemistry and self assembly (L2)

- **demonstrate** the application of Rotaxanes and Catenanes as artificial molecular machines (L2)

#### **Text Books:**

1. Jain and Jain, Engineering Chemistry, 16/e, DhanpatRai, 2013.
2. Peter Atkins, Julio de Paula and James Keeler, Atkins' Physical Chemistry, 10/e, Oxford University Press, 2010.

#### **Reference Books:**

1. J. D. Lee, Concise Inorganic Chemistry, 5/e, Oxford University Press, 2008.
2. Skoog and West, Principles of Instrumental Analysis, 6/e, Thomson, 2007.
3. J.M.Lehn, Supra Molecular Chemistry, VCH Publications

#### **Course Outcomes:**

At the end of the course, the students will be able to

- **compare** the materials of construction for battery and electrochemical sensors (L2)
- **explain** the preparation, properties, and applications of thermoplastics &thermosettings, elastomers & conducting polymers. (L2)
- **explain** the principles of spectrometry, GC and HPLC in separation of gaseous and liquid mixtures (L2)
- **apply** the principle of supramolecular chemistry in application of molecular machines and switches (L3)

**(19A05101T) PROBLEM SOLVING AND PROGRAMMING**

**(Common to All Branches of Engineering)**

**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

**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 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 2:**

**Introduction to computer problem solving:** Introduction, the problem-solving aspect, top-down design, implementation 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-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:** 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<sup>th</sup> 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. Pradip Dey, and Manas Ghosh, “Programming in C”, 2018, Oxford University Press.
2. R.G. Dromey, “How to Solve it by Computer”. 2014, Pearson.
3. Brian W. Kernighan, and Dennis M. Ritchie, “The C Programming Language”, 2<sup>nd</sup> Edition, Pearson.

**Reference Books:**

1. RS Bichkar “Programming with C”, 2012, Universities Press.
2. Pelin Aksoy, and Laura Denardis, “Information Technology in Theory”, 2017, Cengage Learning.
3. Byron Gottfried and Jitender Kumar Chhabra, “Programming with C”, 4<sup>th</sup> 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)

**(19A03102) ENGINEERING GRAPHICS LAB**  
**(Common to All Branches of Engineering)**

**Course Objectives:**

- Bring awareness that Engineering Drawing is the Language of Engineers.
- Familiarize how industry communicates technical information.
- Teach the practices for accuracy and clarity in presenting the technical information.
- Develop the engineering imagination essential for successful design.
- Instruct the utility of drafting & modeling packages in orthographic and isometric drawings.
- Train the usage of 2D and 3D modeling.
- Instruct graphical representation of machine components.

**Part A: Manual Drawing: (7 Classes)**

**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) Cycloid, epicycloids and hypocycloid

c) Involute (2L + 6P hrs)

**Projection of points, lines and planes:** Projection of points in any quadrant, lines inclined to one or both planes, finding true lengths, angle made by line. Projections of regular plane surfaces. (2L + 6P hrs)

**Projections of solids:** Projections of regular solids inclined to one or both planes by rotational or auxiliary views method. (1L + 3P hrs)

**Sections of solids:** Section planes and sectional view of right regular solids- prism, cylinder, pyramid and cone. True shapes of the sections. (1L + 3P hrs)

**Development of surfaces:** Development of surfaces of right regular solids-prism, cylinder, pyramid, cone and their sectional parts. (1L + 6P hrs)

**Part B: Computer Aided Drafting: (6 Classes)**

**Introduction to AutoCAD:** Basic drawing and editing commands: line, circle, rectangle, erase, view, undo, redo, snap, object editing, moving, copying, rotating, scaling, mirroring, layers, templates, polylines, trimming, extending, stretching, fillets, arrays, dimensions. (1L + 3P hrs)

Dimensioning principles and conventional representations.

**Orthographic Projections:** Systems of projections, conventions and application to orthographic projections. (3L + 9P hrs)

**Isometric Projections:** Principles of isometric projection- Isometric scale; Isometric views: lines, planes, simple solids. (2L + 6P hrs)

**Text Books:**

1. K.L.Narayana & P.Kannaiah, Engineering Drawing, 3/e, Scitech Publishers, Chennai, 2012.
2. Venugopal, Engineering Drawing and Graphics, 3/e, New Age Publishers, 2000

**Reference Books:**

1. Dhanajay A Jolhe, Engineering Drawing, Tata McGraw-Hill, Copy Right, 2009
2. N.D.Bhatt, Engineering Drawing, 53/e, Charotar Publishers, 2016.
3. Shah and Rana, Engineering Drawing, 2/e, Pearson Education, 2009
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:**

After completing the course, the student will be able to

- draw various curves applied in engineering. (L2)
- show projections of solids and sections graphically. (L2)
- draw the development of surfaces of solids. (L3)
- use computers as a drafting tool. (L2)
- draw isometric and orthographic drawings using CAD packages. (L3)

**Note:**

1. Manual (part A) and Computer Aided Drafting (part B) classes can be held in alternative weeks for optimal utilization of computer facilities.
2. External examinations to be conducted both manual and computer mode with equal weight of marks.

**Additional Sources**

1. Youtube: <http://sewor.carleton.ca/gkardos/88403/drawings.html> conic sections-online, red woods.edu

**(19A03101) ENGINEERING WORKSHOP**  
**(Common to all branches)**

**Course Objective:**

To familiarize students with wood working, sheet metal operations, fitting and electrical house wiring skills

**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

**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

**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

**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

**Course Outcomes:**

After completion of this lab the student will be able to

1. Apply wood working skills in real world applications. (13)
2. Build different parts with metal sheets in real world applications. (13)
3. Apply fitting operations in various applications. (13)
4. Apply different types of basic electric circuit connections. (13)
5. Demonstrate soldering and brazing. (12)

(19A51102P) CHEMISTRY LAB  
(CSE, CSSE, ECE, EIE, EEE and IT)

**Course Objectives:**

- Verify the fundamental concepts with experiments

**List of Experiments:**

1. Measurement of  $10Dq$  by spectrophotometric method
2. Models of potential energy surfaces
3. Conductometric titration of (i) strong acid vs. strong base, (ii) weak acid vs. strong base
4. Determination of cell constant and conductance of solutions
5. Potentiometry - determination of redox potentials and emfs
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 and NMR
11. HPLC method in separation of gaseous and liquid mixtures
12. 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)
- **prepare** advanced polymer materials (L2)
- **measure** the strength of an acid present in secondary batteries (L3)
- **analyse** the IR and NMR of some organic compounds (L3)

**(19A05101P) PROBLEM SOLVING AND PROGRAMMING LAB**  
**(Common to All Branches of Engineering)**

**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 kth 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  
$$\text{Sum} = 1 - 3 + 5 - 7 + 9$$
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  
$$1 - x^2/2! + x^4/4! - x^6/6! + \dots$$
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 stars 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, 2<sup>nd</sup> edition, 2002.
2. R.G. Dromey, "How to Solve it by Computer". 2014, Pearson.

**(19A02201T) BASIC ELECTRICAL & ELECTRONICS ENGINEERING**

**Part A: Basic Electrical Engineering**  
**(Civil, Mechanical, CSE, CSSE, IT and Food Technology)**

**Course Objectives:**

1. To introduce basics of electric circuits.
2. To teach DC and AC electrical circuit analysis.
3. To explain working principles of transformers and electrical machines.
4. To impart knowledge on low voltage electrical installations

**Unit 1 DC & AC Circuits:**

Electrical circuit elements (R - L and C) - Kirchhoff laws - Series and parallel connection of resistances with DC excitation. Superposition Theorem - Representation of sinusoidal waveforms - peak and rms values - phasor representation - real power - reactive power - apparent power - power factor - Analysis of single-phase ac circuits consisting of RL - RC - RLC series circuits.

**Unit Outcomes: Able to**

- Recall Kirchhoff laws (L1)
- Analyze simple electric circuits with DC excitation (L4)
- Apply network theorems to simple circuits (L3)
- Analyze single phase AC circuits consisting of series RL - RC - RLC combinations (L4)

**Unit 2 DC & AC Machines:**

Principle and operation of DC Generator - EMF equations - OCC characteristics of DC generator – principle and operation of DC Motor – Performance Characteristics of DC Motor - Speed control of DC Motor – Principle and operation of Single Phase Transformer - OC and SC test on transformer - principle and operation of Induction Motor [ Elementary treatment only ]

**Unit Outcomes: Able to**

- Explain principle and operation of DC Generator & Motor.
- Perform speed control of DC Motor (L2)
- Explain operation of transformer and induction motor. (L2)
- Explain construction & working of induction motor - DC motor

**Unit 3 Basics of Power Systems:**

Layout & operation of Hydro, Thermal, Nuclear Stations - Solar & wind generating stations – Typical AC Power Supply scheme – Elements of Transmission line – Types of Distribution systems: Primary & Secondary distribution systems.



**Unit Outcomes: Able to**

- Understand working operation of various generating stations (L2)
- Explain the types of Distribution systems

**Text Books:**

1. D. P. Kothari and I. J. Nagrath - “Basic Electrical Engineering” - Tata McGraw Hill - 2010.
2. V.K. Mehta & Rohit Mehta, “Principles of Power System” – S.Chand – 2018.

**References:**

1. L. S. Bobrow - “Fundamentals of Electrical Engineering” - Oxford University Press - 2011.
2. E. Hughes - “Electrical and Electronics Technology” - Pearson - 2010.
3. C.L. Wadhwa – “Generation Distribution and Utilization of Electrical Energy”, 3rd Edition, New Age International Publications.

**Course Outcomes:**

- Apply concepts of KVL/KCL in solving DC circuits (L3)
- Choose correct rating of a transformer for a specific application (L5)
- Illustrate working principles of induction motor - DC Motor (L3)
- Identify type of electrical machine based on their operation.(L1)
- Describe working principles of protection devices used in electrical circuits. (L2)

**Part B: Basic Electronics Engineering****Course Objectives:**

- To provide comprehensive idea about working principle, operation and applications of PN junction & zener diodes, BJT, FET, MOSFET and operational amplifier
- To introduce fundamentals of digital electronics
- To educate on principles of various communication systems
- To teach efficacy of electronic principles which are pervasive in engineering applications

**Unit I Analog Electronics**

Overview of Semiconductors, PN junction diode, Zener diode, Applications of diode as switch and rectifier, Zener diode as regulator, special purpose diodes: schottky diode, tunnel diode, varactor diode, photodiode, phototransistor and LED.

BJT construction, operation, configuration and characteristics, JFET and MOSFET construction, operation, characteristics (CS configuration), applications

Operational Amplifiers: Introduction, block diagram, basic op-amp circuits: Inverting, Non Inverting, summer, subtractor, voltage follower.

**Unit Outcomes:**

- Describe operation and characteristics of diodes and transistors (L2)
- Make use of diodes and transistors in simple, typical circuit applications (L3)
- Understand operation of basic op-amp circuits (L2)

## **Unit II            Digital Electronics**

Introduction, Switching and Logic Levels, Digital Waveform, characteristics of digital ICs, logic gates, number systems, combinational circuits - adders, multiplexers, decoders; introduction to sequential circuits, flip flops, shift register, binary counter.

### **Unit Outcomes:**

- Explain different logic gates using truth table (L2)
- Distinguish combinational and sequential circuits (L2)
- Analyze various combinational circuits such as adders, multiplexers and decoders (L4)
- Understand functionality of flip-flops, shift registers and counters (L2)

## **Unit III            Communication Systems**

Introduction, Elements of Communication Systems, EM spectrum, basics of electronic communication, Amplitude and Frequency modulation, Pulse modulation, Communication receivers, Examples of communication systems: Microwave & Satellite, Fibre optic, Television, mobile communication (block diagram approach).

### **Unit Outcomes:**

- Describe basic elements of a communication system (L2)
- Explain need for modulation and different modulation techniques (L2)
- Understand functioning of various communication systems (L2)

### **Text Books:**

1. D.P. Kothari, I.J.Nagrath, Basic Electronics, 2<sup>nd</sup> edition, McGraw Hill Education(India)Private Limited
2. S.K. Bhattacharya, Basic Electrical and Electronics Engineering, 2<sup>nd</sup> edition, Pearson India Private Limited.

### **Reference Books:**

1. R. Muthusubramanian, S. Salivahanan, “Basic Electrical and Electronics Engineering”, Tata McGraw-Hill Education, Reprint 2012.
2. David Bell, Electronic Devices and Circuits: Oxford University Press, 5th EDn., 2008.

**(19A54202) PROBABILITY AND STATISTICS**

**(Common to CSE, IT and Food Technology)**

**Course Objectives:**

- 1) To familiarize the students with the foundations of probability and statistical methods
- 2) To impart probability concepts and statistical methods in various applications Engineering

**Unit 1: Descriptive statistics and methods for data science**

**10 hrs**

Data science, Statistics Introduction, Population vs Sample, Collection of data, primary and secondary data, Type of variable: dependent and independent Categorical and Continuous variables, Data visualization, Measures of Central tendency, Measures of Variability (spread or variance) Skewness Kurtosis, correlation, correlation coefficient, rank correlation, regression coefficients, principle of least squares, method of least squares, regression lines.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- summarize the basic concepts of data science and its importance in engineering (L2)
- analyze the data quantitatively or categorically, measure of averages, variability (L4)
- adopt correlation methods and principle of least squares, regression analysis (L5)

**UNIT 2: Probability**

**8 hrs**

Probability, probability axioms, addition law and multiplicative law of probability, conditional probability, Baye's theorem, random variables (discrete and continuous), probability density functions, properties, mathematical expectation.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- define the terms trial, events, sample space, probability, and laws of probability (L1)
- make use of probabilities of events in finite sample spaces from experiments (L3)
- apply Baye's theorem to real time problems (L3)
- explain the notion of random variable, distribution functions and expected value(L2)

**UNIT 3: Probability distributions**

**6 hrs**

Probability distribution - Binomial, Poisson approximation to the binomial distribution and normal distribution-their properties.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- apply Binomial and Poisson distributions for real data to compute probabilities, theoretical frequencies (L3)
- interpret the properties of normal distribution and its applications (L2)

**Unit4: Estimation and Testing of hypothesis, large sample tests**

**8 hrs**

Estimation-parameters, statistics, sampling distribution, point estimation, Formulation of null hypothesis, alternative hypothesis, the critical and acceptance regions, level of significance, two types of errors and power of the test. Large Sample Tests: Test for single proportion, difference of proportions, test for single mean and difference of means. Confidence interval for parameters in one sample and two sample problems

### **Learning Outcomes:**

At the end of this unit, the student will be able to

- explain the concept of estimation, interval estimation and confidence intervals (L2)
- apply the concept of hypothesis testing for large samples (L4)

### **Unit 5: Small sample tests**

**8 hrs**

Student t-distribution (test for single mean, two means and paired t-test), testing of equality of variances (F-test),  $\chi^2$  - test for goodness of fit,  $\chi^2$  - test for independence of attributes.

### **Learning Outcomes:**

At the end of this unit, the student will be able to

- apply the concept of testing hypothesis for small samples to draw the inferences (L3)
- estimate the goodness of fit (L5)

### **Text Books:**

1. Miller and Friends, Probability and Statistics for Engineers, 7/e, Pearson, 2008.
2. S.C. Gupta and V.K. Kapoor, Fundamentals of Mathematical Statistics, 11/e, Sultan Chand & Sons Publications, 2012.

### **Reference Books:**

1. S. Ross, a First Course in Probability, Pearson Education India, 2002.
2. W. Feller, an Introduction to Probability Theory and its Applications, 1/e, Wiley, 1968.

### **Course Learning Outcomes:**

Upon successful completion of this course, the student should be able to

- make use of the concepts of probability and their applications (L3)
- apply discrete and continuous probability distributions (L3)
- classify the concepts of data science and its importance (L4)
- interpret the association of characteristics and through correlation and regression tools (L4)
- design the components of a classical hypothesis test (L6)
- infer the statistical inferential methods based on small and large sampling tests (L6)

**(19A56101T) APPLIED PHYSICS**  
**(ECE, CSE, EEE & IT Branches)**

**Course Objectives:**

- To identify the importance of the optical phenomenon i.e. interference, diffraction and polarization related to its Engineering applications.
- To explain the significant concepts of dielectric and magnetic materials this leads to potential applications in the emerging micro devices.
- To impart knowledge in basic concepts of electromagnetic waves and its propagation in optical fibers along with its Engineering applications.
- To identify the importance of semiconductors in the functioning of electronic devices.
- To teach the concepts related to superconductivity which lead to their fascinating applications.
- To familiarize the applications of nanomaterials relevant to engineering branches.

**Unit-I : Wave Optics**

**8hrs**

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 -Determination of Wavelength - Engineering applications of diffraction

Polarization-Polarization by double refraction-Nicol's Prism--Half wave and Quarter wave plate- Engineering applications of Polarization.

**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 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)

**Unit-II : Dielectric and Magnetic Materials**

**(8hrs)**

Introduction--Dielectric polarization-Dielectric polarizability, Susceptibility and Dielectric constant- Types of polarizations: Electronic and Ionic, (Quantitative), Orientation Polarizations (Qualitative) - Frequency dependence of polarization-Lorentz (internal) field-Claussius - Mosotti equation-Applications of Dielectrics: Ferroelectricity.

Introduction-Magnetic dipole moment-Magnetization-Magnetic susceptibility and permeability- Origin of permanent magnetic moment -Classification of Magnetic materials-

Weiss theory of ferromagnetism (qualitative)-Hysteresis-soft and hard magnetic materials-Magnetic device applications (Magnetic bubble memory).

**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)
- **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 – III: Electromagnetic Waves and Fiber Optics**

**10hrs**

Divergence and Curl of Electric and Magnetic Fields- Gauss' theorem for divergence and Stokes' theorem for curl- Maxwell's Equations (Quantitative)- Electromagnetic wave propagation (Non-conducting medium) -Poynting's Theorem.

Introduction to Optical Fibers-Total Internal Reflection-Critical angle of propagation-Acceptance angle-Numerical Aperture-Classification of fibers based on Refractive index profile –Propagation of electromagnetic wave through optical fiber – modes -importance of V-number-Attenuation, Block Diagram of Fiber optic Communication -Medical Applications-Fiber optic Sensors.

**Unit Outcomes:**

**The students will be able to**

- **apply** the Gauss' theorem for divergence and Stokes' theorem for curl (L3)
- **evaluate** the Maxwell's equations, Maxwell's displacement current and correction in Ampere's law (L5)
- **asses** the electromagnetic wave propagation and its power in non-conducting medium (L5)
- **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).

**Unit – IV: Semiconductors**

**8 hrs**

Origin of energy bands - Classification of solids based on energy bands – Intrinsic semiconductors - density of charge carriers-Fermi energy – Electrical conductivity - extrinsic semiconductors - P-type & N-type - Density of charge carriers - Dependence of Fermi energy on carrier concentration and temperature- Direct and Indirect band gap semiconductors-Hall effect- Hall coefficient - Applications of Hall effect - Drift and Diffusion currents - Continuity equation - Applications of Semiconductors.

**Unit Outcomes:**

The students will be able to

- **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)

### **Unit – V: Superconductors and Nanomaterials**

**8 hrs**

Superconductors-Properties- Meissner's effect-BCS Theory-Josephson effect (AC &DC)-Types of Super conductors-Applications of superconductors.

Nano materials – Significance of nanoscale – Properties of nanomaterials: Physical, Mechanical, Magnetic, Optical – Synthesis of nanomaterials: Top-down-Ball Milling, Bottom-up -Chemical vapour deposition – characterization of nanomaterials: X-Ray Diffraction (XRD), Scanning Electron Microscope (SEM) - Applications of Nano materials.

### **Unit Outcomes:**

The students will be able to

- **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).

### **Text Books:**

1. M. N. Avadhanulu, P.G. Kshirsagar & TVS Arun Murthy” A Text book of Engineering Physics”- S. Chand Publications, 11<sup>th</sup> Edition 2019.
2. B.K. Pandey and S. Chaturvedi, Engineering Physics, Cengage Learning, 2012.

### **Reference Books:**

1. Shatendra Sharma, Jyotsna Sharma, “ Engineering Physics”, Pearson Education,2018
2. David J.Griffiths, “Introduction to Electrodynamics”- 4/e, Pearson Education,2014
3. T Pradeep “A Text book of Nano Science and Nano Technology”- Tata Mc GrawHill 2013

### **Course Outcomes:**

The students will be able to

- **identify** the wave properties of light and the interaction of energy with the matter (L3)
- **apply** electromagnetic wave propagation in different guided media (L2)
- **asses** the electromagnetic wave propagation and its power in different media (L5)
- **calculate** conductivity of semiconductors (L3)
- **interpret** the difference between normal conductor and superconductor (L2)
- **demonstrate** the application of nanomaterials (L2)

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR**

**(19A05201T) DATA STRUCTURES**  
**(Common to All Branches of Engineering)****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: B-Trees, 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**

File Organization: Sequential File Organization, Direct File Organization, Indexed Sequential File Organization.

Advanced sorting: 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”, 2<sup>nd</sup> Edition, University Press, 2007.
2. Alan L. Tharp, “File Organization and Processing”, Wiley and Sons, 1988.

**Reference Books:**

1. D. Samanta, “Classic Data Structures”, 2<sup>nd</sup> Edition, Prentice-Hall of India, Pvt. Ltd., India, 2012.
2. Peter Bras, “Advanced Data Structures”, Cambridge University Press, 2016
3. 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. Analyse the Algorithms (L4)
5. Develop Algorithm for Sorting large files of data (L3)

(19A52101T) COMMUNICATIVE ENGLISH I  
(Common to All Branches of Engineering)

### 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.

### Course Objectives

- Facilitate effective listening skills for better comprehension of academic lectures and English spoken by native speakers
- Focus on appropriate reading strategies for comprehension of various academic texts and authentic materials
- Help improve speaking skills through participation in activities such as role plays, discussions and structured talks/oral presentations
- Impart effective strategies for good writing and demonstrate the same in summarizing, writing well organized essays, record and report useful information
- Provide knowledge of grammatical structures and vocabulary and encourage their appropriate use in speech and writing

### Unit 1

**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: countables and uncountables; 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

**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

**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

**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

**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

### Text Book

- **English all round: Communication Skills for Undergraduate Learners** Vol. I, Orient BlackSwan Publishers, First Edition 2019.

## 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.

## Sample Web Resources

Grammar/Listening/Writing

[1-language.com](http://1-language.com)

<http://www.5minuteenglish.com/>

<https://www.englishpractice.com/>

Grammar/Vocabulary

[English Language Learning Online](#)

<http://www.bbc.co.uk/learningenglish/>

<http://www.better-english.com/>

<http://www.nonstopenglish.com/>

<https://www.vocabulary.com/>

[BBC Vocabulary Games](#)

[Free Rice Vocabulary Game](#)

Reading

<https://www.usingenglish.com/comprehension/>

<https://www.englishclub.com/reading/short-stories.htm>

<https://www.english-online.at/>

Listening

<https://learningenglish.voanews.com/z/3613>

<http://www.englishmedialab.com/listening.html>

Speaking

<https://www.talkenglish.com/>

[BBC Learning English – Pronunciation tips](#)

[Merriam-Webster – Perfect pronunciation Exercises](#)

All Skills

<https://www.englishclub.com/>

<http://www.world-english.org/>

<http://learnenglish.britishcouncil.org/>

Online Dictionaries

[Cambridge dictionary online](#)

[MacMillan dictionary](#)

[Oxford learner's dictionaries](#)

**Course Outcomes:**

At the end of the course, the learners will be able to

- Understand the context, topic, and pieces of specific information from social or transactional dialogues spoken by native speakers of English
- Apply grammatical structures to formulate sentences and correct word forms
- Analyze discourse markers to speak clearly on a specific topic in informal discussions
- Evaluate reading/listening texts and to write summaries based on global comprehension of these texts.
- Create a coherent paragraph interpreting a figure/graph/chart/table

**(19A05202) COMPUTER SCIENCE AND ENGINEERING 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
- Teach them how to connect two or more computers
- Introduce to the Raspberry Pi board
- Explain storytelling by creating Graphics, Webpages and Videos

**Preparing your Computer**

**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.

**Productivity tools**

**Task 5: 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 6: 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 7: 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.

## **Networking**

**Task 8: Wired network:** Select a LAN cable, Identify the wires in the cable, Define the purpose of each wire, Study the RJ45 connector, Use crimping tool to fix the cable to the connector, Test the cable using LAN tester, Connect two or more computers using cross and straight cables, Configure the computers, share the data between the computers.

**Task 9: Wireless network** Connect the wireless LAN card or identify the built-in wireless LAN card, configure four computers using adhoc mode and share the data, connect four computers using infrastructure mode (Access point) and share the data.

## **IoT**

### **Task 10: Raspberry Pi**

Study the architecture of Raspberry pi, configure software, Install SD card, Connect the cables, Install Raspbian (or any other) operating system, Configure Wi-Fi, Remotely connect to your Raspberry Pi.

## **Story Telling**

### **Task 11: Storytelling**

Use Adobe spark or any other tool to create Graphics, Webpages, and Videos.

## **Reference Books :**

1. B. Govindarajulu, "IBM PC and Clones Hardware Trouble shooting and Maintenance", 2<sup>nd</sup> edition, Tata McGraw-Hill, 2002
2. "MOS study guide for word, Excel, Powerpoint & Outlook Exams", Joan Lambert, Joyce Cox, PHI.
3. "Introduction to Information Technology", ITL Education Solutions limited, Pearson Education.
4. Rusen, "Networking your computers and devices", PHI
5. Bigelows, "Trouble shooting, Maintaining & Repairing PCs", TMH.
6. <https://www.adobe.com>
7. <https://www.raspberrypi.org>

## **Course Outcomes:**



- Construct a computer from its parts and prepare it for use (L3)
- Develop Documents using Word processors (L3)
- Develop presentations using the presentation tool (L3)
- Perform computations using spreadsheet tool (L3)
- Connect computer using wired and wireless connections (L4)
- Design Graphics, Videos and Web pages (L6)
- Connect things to computers (L3)

**(19A52101P) COMMUNICATIVE ENGLISH I LAB**  
**(Common to All Branches of Engineering)**

**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.

**Course Objectives**

- To expose the students to variety of self instructional, learner friendly modes of language learning
- 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.
- To enable them to learn better pronunciation through stress, intonation and rhythm
- To train them to use language effectively to face interviews, group discussions, public speaking
- 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

## Reference Books

- English in Action, 1st Edition, 2019, Maruthi Publications.
- 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.

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Listening

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<http://www.englishmedialab.com/listening.html>

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<https://www.talkenglish.com/>  
[BBC Learning English – Pronunciation tips](#)  
[Merriam-Webster – Perfect pronunciation Exercises](#)

### All Skills

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<http://www.world-english.org/>  
<http://learnenglish.britishcouncil.org/>

### Online Dictionaries

[Cambridge dictionary online](#)  
[MacMillan dictionary](#)  
[Oxford learner's dictionaries](#)

**(19A02201P) BASIC ELECTRICAL & ELECTRONICS ENGINEERING LAB**  
**(Civil, Mechanical, CSE, CSSE, IT and Food Technology)**

**Part A: Electrical Engineering Lab**

**Course Objectives:**

1. To Verify Kirchoff's laws
2. To verify Superposition theorem.
3. To learn performance characteristics of DC Machines.
4. To perform open circuit & Short Circuit test on 1- Phase Transformer.
5. To Study the I – V Characteristics of Solar PV Cell

**List of experiments: -**

1. Verification of Kirchhoff laws.
2. Verification of Superposition Theorem.
3. Open circuit characteristics of a DC Shunt Generator.
4. Speed control of DC Shunt Motor.
5. OC & SC test of 1 – Phase Transformer.
6. Brake test on 3 - Phase Induction Motor.
7. I – V Characteristics of Solar PV cell
8. Brake test on DC Shunt Motor.

**Course Outcomes: Able to**

1. Verify Kirchoff's Laws & Superposition theorem.
2. Perform testing on AC and DC Machines.
3. Study I – V Characteristics of PV Cell

**Part B: Electronics Engineering Lab**

**Course outcomes:**

- Describe construction, working and characteristics of diodes, transistors and operational amplifiers (L2)
- Demonstrate how electronic devices are used for applications such as rectification, switching and amplification (L2)
- Build different building blocks in digital electronics using logic gates (L3)
- Explain functionality of flip-flops, shift registers and counters for data processing applications (L2)
- Explain functioning of various communication systems (L2)

**List of Experiments:**

1. Draw and study the characteristics of Semi-conductor diode and Zener Diode
2. Draw and study the input and output characteristics of Transistor in Common Emitter configuration
3. Draw and study the static and transfer characteristics of FET in Common Source Configuration

4. Construct half wave and full wave rectifier circuits. Find ripple factor and plot their output waveforms with and without filters
5. Study the application of Op-amp as an Inverting amplifier, Non-inverting amplifier, Voltage follower, Summer and Subtractor
6. Realization of logic gates, AND, OR, NOT, NAND, NOR, XOR
7. Realization of Adders, Multiplexers and Decoders using logic gates.
8. Realization of flip-flops using logic gates.
9. Conduct an experiment on AM & FM modulation & demodulation, Plot the corresponding modulated and demodulated signals

**(19A56101P) APPLIED PHYSICS LAB**  
**(ECE, CSE, CSSE, EEE, EIE & IT Branches)**

**Course Objectives:**

- Understands the concepts of interference and 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 12 experiments must be performed in a semester**

**List of Physics Experiments**

1. Determine the thickness of the wire 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 ring method  
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 wavelength by plane diffraction grating 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. Dispersive power of a diffraction grating  
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)
5. Resolving power of a grating  
Experimental outcomes:  
operates optical instrument like spectrometer. (L2)  
estimate the resolving power of the grating (L2)  
Illustrates the role of resolving power in various optical instruments. (L3)
6. Determination of dielectric constant by charging and discharging method.  
Experimental outcomes:



- operates various instruments and connect them as per the circuit. (L2)  
 estimate the dielectric constant of the given substance. (L2)  
 Identifies the significance of dielectric constant in various devices. (L2)
7. Magnetic field along the axis of a circular coil carrying current.  
 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)
8. To determine the self inductance of the coil (L) using Anderson's bridge.  
 Experimental outcomes:  
 operates various instruments and connect them as per the circuit. (L2)  
 estimate the self inductance of the coil using Anderson's bridge. (L2)  
 Identifies the significance of self inductance of the coil in electric devices. (L2)
9. Study the variation of B versus H by magnetizing the magnetic material (B-H curve)  
 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)
10. To determine the numerical aperture of a given optical fiber and hence to find its acceptance angle  
 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 a optical fiber in various engineering applications. (L2)
11. 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)
12. Determination of Hall voltage and Hall coefficient of a given semiconductor using 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)
13. To determine 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)
14. To determine the energy gap of a semiconductor  
 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)
15. Measurement of resistance with varying temperature.  
 Experimental outcomes:  
 operates various instruments and connect them as per the circuit. (L2)  
 estimate the resistance with varying temperature. (L2)  
 plots **resistance** R with temperature T (L3)

### 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** magnetic susceptibility of the material and its losses by B-H curve (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 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

**(19A05201P) DATA STRUCTURES LAB**  
**(Common to All Branches of Engineering)**

**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 datatype 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)

(19A54303) MATHEMATICAL FOUNDATIONS OF COMPUTER SCIENCE

**Course Objectives**

- To explain about the Boolean Algebra, Graph theory and Recurrence relations.
- To demonstrate the application of basic methods of discrete mathematics in Computer Science problem solving.
- To elucidate solving mathematical problems from algorithmic perspective.
- To introduce the mathematical concepts which will be useful to study advanced courses Design and Analysis of Algorithms, Theory of Computation, Cryptography and Software Engineering etc.
- To reveal how solutions of graph theory can be applied to computer science problems

**UNIT- I**

**Statements and Notation, Connectives-** Negation, Conjunction, Disjunction, Conditional and Bi-conditional, Statement formulas and Truth Tables. Well-formed formulas, Tautologies, Equivalence of Formulas, Duality Law, Tautological Implications.

**Normal Forms:** Disjunctive Normal Forms, Conjunctive Normal Forms, Principal Disjunctive Normal Forms (PDNF), Principal Conjunctive Normal Forms (PCNF), Ordering and Uniqueness of Normal Forms.

**The Theory of Inference for the Statement Calculus:** Rules of Inference, Consistency of Premises and Indirect Method of Proof.

**The predicate Calculus, Inference theory of the Predicate Calculus.**

**Unit Outcomes:**

- Describe logical sentences in terms of predicates, quantifiers, and logical connectives (L1)
- Evaluate basic logic statements using truth tables and the properties of logic (L5).
- Apply rules of inference to test the consistency of premises and validity of arguments (L3).
- Verify the equivalence of two formulas and their duals (L4).
- Find the Principal Conjunctive and Principal Disjunctive Normal Forms of a statement formula (L1).

**UNIT-II**

**Set Theory:** Basic concepts of Set Theory, Representation of Discrete structures, Relations and Ordering, Functions, Recursion.

**Lattices and Boolean algebra:** Lattices as Partially Ordered Sets, Boolean algebra, Boolean Functions, Representation and Minimization of Boolean Functions.

**Algebraic Structures:** Algebraic Systems: Examples and General Properties, Semi Groups and Monoids, Groups.

**Unit Outcomes:**

- Describe equivalence, partial order and compatible relations (L1).
- Compute Maximal Compatibility Blocks (L3).
- Identify the properties of Lattices (L2).
- Evaluate Boolean functions and simplify expression using the properties of Boolean algebra (L5).
- Infer Homomorphism and Isomorphism (L4).
- Describe the properties of Semi groups, Monoids and Groups (L1).

**UNIT-III**

**Elementary Combinatorics:** Basics of Counting, Combinations and Permutations, Enumeration of Combinations and Permutations, Enumerating Combinations and Permutations with repetitions, Enumerating Permutations and Combinations with constrained Representations, Binomial Coefficients, The Binomial and Multinomial Theorems, The Principle of Inclusion and Exclusion.

**Unit Outcomes:**

- Explain fundamental principle of counting (L2).
- Examine the relation between permutation and combination (L4).
- Solve counting problems by applying elementary counting techniques using the product and sum rules (L3).
- Apply permutations, combinations, the pigeon-hole principle, and binomial expansion to solve counting problems (L3).

**UNIT-IV:**

**Recurrence Relations:** Generating Functions of Sequences, Calculating Coefficients of Generating Functions, Recurrence Relations, Solving Recurrence Relations by Substitution and Generating Functions, The method of Characteristic Roots, Solution of Inhomogeneous Recurrence Relations.

**Unit Outcomes:**

- Find the generating functions for a sequence (L1).
- Design recurrence relations using the divide-and-conquer algorithm (L6).
- Solve linear recurrence relations using method of Characteristic Roots (L3).
- Outline the general solution of homogeneous or Inhomogeneous Recurrence Relations using substitution and method of generating functions (L2).
- Solve problems using recurrence relations and recursion to analyze complexity of algorithms (L3).

## **UNIT-V:**

**Graphs:** Basic Concepts, Isomorphism and Sub graphs, Trees and their Properties, Spanning Trees, Directed Trees, Binary Trees, Planar Graphs, Euler's Formula, Multigraphs and Euler Circuits, Hamiltonian Graphs, Chromatics Number, The Four-Color Problem

### **Unit Outcomes:**

- Investigate if a given graph is simple or a multigraph, directed or undirected, cyclic or acyclic (L4).
- Describe complete graph and complete bipartite graphs (L1).
- Identify Euler Graphs, Hamilton Graph and Chromatic Number of a graph (L2).
- Apply the concepts of functions to identify the Isomorphic Graphs (L3).
- Apply depth-first and breadth-first search (L3).
- Apply Prim's and Kruskal's algorithms to find a minimum spanning tree (L3).

### **Course Outcomes:**

After completion of this course the student would be able to

- Evaluate elementary mathematical arguments and identify fallacious reasoning (L5).
- Understand the properties of Compatibility, Equivalence and Partial Ordering relations, Lattices and Has see Diagrams (L1).
- Understand the general properties of Algebraic Systems, Semi Groups, Monoids and Groups (L1).
- Design solutions for problems using breadth first and depth first search techniques (L6)
- Solve the homogeneous and non-homogeneous recurrence relations (L3).
- Apply the concepts of functions to identify the Isomorphic Graphs (L2).
- Identify Euler Graphs, Hamilton Graph and Chromatic Number of a graph (L2).

### **Text Books:**

1. Joe L. Mott. Abraham Kandel and Theodore P. Baker, "Discrete Mathematics for Computer Scientists & Mathematicians", 2<sup>nd</sup> Edition, Pearson, 2008. (for Units III to V).
2. J P Trembly and R Manohar, "Discrete Mathematical Structures with Applications to Computer Science", 1<sup>st</sup> Edition, McGraw Hill, 2017(For Unit I&II).

### **Reference Books:**

1. Ralph P. Grimaldi and B.V. Ramana, "Discrete and Combinatorial Mathematics, an Applied Introduction", 5<sup>th</sup> Edition, Pearson, 2016.
2. Narsingh Deo, "Graph Theory with Applications to Engineering", Prentice Hall, 1979.
3. D.S. Malik and M.K. Sen, "Discrete Mathematics theory and Applications", 1<sup>st</sup> Edition, Cenegage Learning, 2012.
4. C L Liu and D P Mohapatra, "Elements of Discrete Mathematics, A computer Oriented approach", 4<sup>th</sup> edition, MCGRAW-HILL, 2018.

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR**

(19A05301) DIGITAL LOGIC DESIGN

(Common to CSE & IT)

**Course Objectives:**

- Understanding basic number systems, codes and logical gates.
- Acquiring the skills to manipulate and examine Boolean algebraic expressions, logical operations, and Boolean functions
- Acquainting with classical hardware design for both combinational and sequential logic circuits
- Experiencing about synchronous circuits.
- Obtaining the knowledge about various types of memories.

**UNIT - I**

**Digital Systems and Binary Numbers:** Digital Systems, Binary Numbers, Number base conversions, Octal, Hexadecimal and other base numbers, complements, signed binary numbers, binary codes, binary storage and registers, binary logic.

**Boolean algebra and logic gates:** Basic theorems and properties of Boolean algebra, Boolean functions, canonical and standard forms, Digital Logic Gates.

**Unit Outcomes:**

**Student is able to**

- Summarize the binary number system
- Illustrate various binary codes
- Describe the basic postulates of Boolean Algebra
- Develop a logic diagram using gates from a Boolean function

**UNIT - II**

**Gate–Level Minimization:** The Map Method, Four-Variable K-Map, sum of products, product of sums simplification, Don't care conditions, Simplification by Quine- McClusky Method, NAND and NOR implementation and other two level implementations, Exclusive-OR function.

**Unit Outcomes:**

**Student is able to**

- Apply the map method for simplifying Boolean Expressions.
- Apply Don't care conditions to simplify a Karnaugh map.
- Design two-level Boolean functions with NAND gates and NOR gates

**UNIT - III**



**Combinational Logic:** Combinational Circuits, Analysis of Combinational Circuits, Design Procedure, Binary Adder-Subtractor, Decimal Adder, Binary Multiplier, Magnitude Comparator, Decoders, Encoders, Multiplexers and Demultiplexers.

**Unit Outcomes:**

**Student is able to**

- Select fundamental combinational logic circuits.
- Analyze and design combinational circuits.
- Design Boolean function with a multiplexer.

**UNIT - IV**

**Synchronous Sequential Circuits:** Latches, Flip-flops, analysis of clocked sequential circuits, **Register and Counters:** Registers, Shift registers, Ripple counters, Synchronous counters and other counters.

**Unit Outcomes:**

**Student is able to**

- Explain the functionalities of latch and different flip-flops.
- Analyze and design clocked sequential circuits.
- Describe the use of sequential circuit components in complex digital systems.

**UNIT - V**

**Memory and Programmable Logic:** Random-Access memory, Memory decoding, ROM, Programmable Logic Array, Programmable Array Logic, Sequential programmable devices.

**Digital Integrated Circuits:** RTL and DTL Circuits, Transistor-Transistor Logic (TTL), Emitter-Coupled Logic (ECL), MOS, CMOS Logic, Comparisons of Logic Families

**Unit Outcomes:**

**Student is able to**

- Interpret the types of memories.
- Construct the Boolean functions with PLA and PAL.
- Describe the most common integrated circuit digital logic families.

**Course Outcomes:**

**Students should be able to**

- Analyze the number systems and codes.
- Decide the Boolean expressions using Minimization methods.
- Design the sequential and combinational circuits.
- Apply state reduction methods to solve sequential circuits.
- Describe various types of memories.

**TEXT BOOKS:**

1. M. Morris Mano, M.D. Ciletti, "Digital Design", 5th edition, Pearson, 2018.

**REFERENCE BOOKS:**

1. Donald P Leach, Albert Paul Malvino, Goutam Saha, "Digital Principles and applications", Mc Graw Hill , 8th Edition,2015.
2. David J. Comer, "Digital Logic & State Machine Design", Oxford University Press, 3rd Reprinted Indian Edition, 2012
3. R.D. Sudhakar Samuel, "Digital Logic Design", Elsevier Publishers.

**(19A99304) DESIGN THINKING**

(Common to CSE & IT)

Preamble: Design is a realization of a concept or idea into a configuration, drawing or a product. Design thinking is cognitive and practical processes by which design concepts are developed by designers. Innovation is a new idea or a new concept. Product development is the creation of a new or different product that offers new benefits to the end user. This course introduces the design thinking in product innovation.

**Course Objectives:**

- To familiarize product design process
- To introduce the basics of design thinking
- To bring awareness on idea generation
- To familiarize the role of design thinking in services design

**Unit -I**

Introduction to design, characteristics of successful product development, product development process, identification of opportunities, product planning, Innovation in product development.

**Unit -II**

Design thinking: Introduction, Principles, the process, Innovation in design thinking, benefits of Design thinking, design thinking and innovation, case studies.

**Unit-III**

Idea generation: Introduction, techniques, Conventional methods, Intuitive methods, Brainstorming, Gallery method, Delphi method, Synectics, etc

Select ideas from ideation methods, case studies.

**Unit-IV**

Design Thinking in Information Technology, Design thinking in Business process model, Design thinking for agile software development, virtual collaboration, multi user and multi account interaction, need for communication, TILES toolkit, Cloud implementation.

**Unit V**

Design thinking for service design: How to design a service, Principles of service design, Benefits of service design, Service blueprint, Design strategy, organization, principles for information design, principles of technology for service design.

**Course Outcomes:**

Student should be able to

- Generate and develop different design ideas.
- Appreciate the innovation and benefits of design thinking.
- Experience the design thinking process in IT and agile software development.
- Understand design techniques related to variety of software services

**Reference Books:**

1. Christoph Meinel and Larry Leifer, “Design Thinking”, Springer, 2011
2. Aders Riise Maehlum, “Extending the TILES Toolkit” from Ideation to Prototyping
3. <http://www.algarytm.com/it-executives-guide-to-design-thinking:e-book>.
4. Marc stickdorn and Jacob Schneider, “This is Service Design Thinking”, Wiely, 2011
5. Pahl and Vietz, “Engineering Design”, Springer, 2007

(19A05302T) DATABASE MANAGEMENT SYSTEMS  
(COMMON TO CSE & IT)

**Course objectives:**

This course is designed to:

- Train in the fundamental concepts of database management systems, database modeling and design, SQL, PL/SQL and system implementation techniques.
- Enable students to model ER diagram for any customized application
- Inducting appropriate strategies for optimization of queries.
- Provide knowledge on concurrency techniques
- Demonstrate the organization of Databases

**UNIT-I: Introduction:** Database systems applications, Purpose of Database Systems, view of Data, Database Languages, Relational Databases, Database Design, Data Storage and Querying, Transaction Management, Database Architecture, Data Mining and Information Retrieval, Specialty Databases, Database users and Administrators,

**Introduction to Relational Model:** Structure of Relational Databases, Database Schema, Keys, Schema Diagrams, Relational Query Languages, Relational Operations

At the end of the Unit, students will be able to:

- Distinguish between Database and File System
- Categorize different kinds of data models
- Define functional components of DBMS

**UNIT-II: Introduction to SQL:** Overview of the SQL Query Language, SQL Data Definition, Basic Structure of SQL Queries, Additional Basic Operations, Set Operations, Null Values, Aggregate Functions, Nested Sub-queries, Modification of the Database. Intermediate SQL: Joint Expressions, Views, Transactions, Integrity Constraints, SQL Data types and schemas, Authorization.

**Advanced SQL:** Accessing SQL from a Programming Language, Functions and Procedures, Triggers, Recursive Queries, OLAP, Formal relational query languages.

At the end of the Unit, students will be able to:

1. Outline the elements of the relational model such as domain, attribute , tuple, relation and entity
2. Distinguish between various kinds of constraints like domain, key and integrity
3. Define relational schema
4. Develop queries using Relational Algebra and SQL
5. Perform DML operations on databases

**UNIT-III: Database Design and the E-R Model:** Overview of the Design Process, The Entity-Relationship Model, Constraints, Removing Redundant Attributes in Entity Sets, Entity-Relationship Diagrams, Reduction to Relational Schemas, Entity-Relationship Design Issues.

**Relational Database Design:**

Features of Good Relational Designs, Atomic Domains and First Normal Form, Decomposition Using Functional Dependencies, Functional-Dependency Theory, Algorithms for Decomposition, Decomposition Using Multivalued Dependencies, More Normal Forms

At the end of the Unit, students will be able to:

- Develop E-R model for the given problem
- Derive tables from E-R diagrams
- Differentiate between various normal forms based on functional dependency
- Apply normalization techniques to eliminate redundancy

**UNIT-IV: Query Processing:** Overview, Measures of Query cost, Selection operation, sorting, Join Operation, other operations, Evaluation of Expressions.

**Query optimization:** Overview, Transformation of Relational Expressions, Estimating statistics of Expression results, Choice of Evaluation Plans, Materialized views, Advanced Topics in Query Optimization.

At the end of the Unit, students will be able to:

1. Identify variety of methods for effective processing of given queries.
2. Obtain knowledge related to optimization techniques.

**UNIT V: Transaction Management:**

Transactions: Concept, A Simple Transactional Model, Storage Structures, Transaction Atomicity and Durability, Transaction Isolation, Serializability, Isolation and Atomicity, Transaction Isolation Levels, Implementation of Isolation Levels, Transactions as SQL Statements.

**Concurrency Control:** Lock based Protocols, Deadlock Handling, Multiple granularity, Timestamp based Protocols, Validation based Protocols.

**Recovery System:** Failure Classification, Storage, Recovery and Atomicity, Recovery Algorithm, Buffer Management, Failure with Loss of Nonvolatile Storage, Early Lock Release and Logical Undo Operations.

At the end of the Unit, students will be able to:

1. Understand various properties of transaction.
2. Design atomic transactions for an application.
3. Gain the knowledge about log mechanism and check pointing techniques for system recovery.

**Course Outcomes**

Students will be able to :

1. Design a database for a real world information system
2. Define transactions which preserve the integrity of the database
3. Generate tables for a database
4. Organize the data to prevent redundancy
5. Pose queries to retrieve the information from database.

**TEXT BOOKS:**

1. A.Silberschatz, H.F.Korth, S.Sudarshan, "Database System Concepts", 6/e, TMH 2019

**REFERENCE BOOKS:**

1. Shamkant B. Navathe, "Database Management System" 6/e RamezElmasri PEA
2. "Database Principles Fundamentals of Design Implementation and Management", Carlos Coronel, Steven Morris, Peter Robb, Cengage Learning.
3. Raghurama Krishnan, Johannes Gehrke, "Database Management Systems", 3/e, TMH

**(19A05303T) OBJECT ORIENTED PROGRAMMING THROUGH JAVA**

**(Common to CSE & IT)**

**Course Objectives:**

- To understand object oriented concepts and problem solving techniques
- To obtain knowledge about the principles of inheritance and polymorphism
- To implement the concept of packages, interfaces, exception handling and concurrency mechanism.
- To design the GUIs using applets and swing controls.
- To understand the Java Database Connectivity Architecture

**UNIT - I**

**Introduction:** Introduction to Object Oriented Programming, The History and Evolution of Java, Introduction to Classes, Objects, Methods, Constructors, this keyword, Garbage Collection, Data Types, Variables, Type Conversion and Casting, Arrays, Operators, Control Statements, Method Overloading, Constructor Overloading, Parameter Passing, Recursion, String Class and String handling methods.

**Unit Outcomes:**

**Student should be able to**

- Understand the syntax, semantics and features of Java Programming Language.
- Learn object oriented features and understanding type conversion and casting.
- Understand different types of string handling functions and its usage.

**UNIT - II**

**Inheritance:** Basics, Using Super, Creating Multilevel hierarchy, Method overriding, Dynamic Method Dispatch, Using Abstract classes, Using final with inheritance, Object class,

**Packages:** Basics, Finding packages and CLASSPATH, Access Protection, Importing packages.

**Interfaces:** Definition, Implementing Interfaces, Extending Interfaces, Nested Interfaces, Applying Interfaces, Variables in Interfaces.

**Unit Outcomes:**

**Student should be able to**

- Implement types of Inheritance and developing new classes based on existing classes
- Distinguish between system packages and user defined packages.



- Demonstrate features of interfaces to implement multiple inheritances.

### UNIT - III

**Exception handling** - Fundamentals, Exception types, Uncaught exceptions, using try and catch, multiple catch clauses, nested try statements, throw, throws and finally, built-in exceptions, creating own exception sub classes.

**Stream based I/O** (java.io) – The Stream classes-Byte streams and Character streams, Reading console Input and Writing Console Output, File class, Reading and writing Files, Random access file operations, The Console class, Serialization, Enumerations, Autoboxing, Generics.

#### Unit Outcomes:

#### Student should be able to

- Learn what exceptions are and how they are handled.
- Learn when to use exception handling and how to create user defined exceptions
- Learn the difference between various files and streams.

### UNIT - IV

**Multithreading:** The Java thread model, Creating threads, Thread priorities, Synchronizing threads, Interthread communication.

**The Collections Framework** (java.util): Collections overview, Collection Interfaces, The Collection classes- Array List, Linked List, Hash Set, Tree Set, Priority Queue, Array Deque. Hashtable, Properties, Stack, Vector, String Tokenizer, Bit Set, Date, Calendar, Random, Formatter, Scanner.

#### Unit Outcomes:

#### Student should be able to

- Understand concurrency, parallelism and multithreading
- Learn the importance of collections and use prebuilt generic data structures from framework.

### UNIT – V

**Applet:** Basics, Architecture, Applet Skeleton, requesting repainting, using the status window, passing parameters to applets

**GUI Programming with Swings** – The origin and design philosophy of swing, components and containers, layout managers, event handling, using a push button, jtextfield, jlabel and image icon, the swing buttons, jtext field, jscrollpane, jlist, jcombobox, trees, jtable, An overview of jmenubar, jmenu and jmenuitem, creating a main menu, showmessagedialog, showconfirmdialog, showinputdialog, showoptiondialog, jdialo, create a modeless dialog.

## Accessing Databases with JDBC:

Types of Drivers, JDBC Architecture, JDBC classes and Interfaces, Basic steps in developing JDBC applications, Creating a new database and table with JDBC.

### Unit Outcomes:

#### Student should be able to

- Learn how to use the Nimbus look-and-feel
- Understand the GUI programming.
- Understand basic steps in developing JDBC applications,

### Course Outcomes:

#### After the completion of the course the student will be able

- To solve real world problems using OOP techniques.
- To apply code reusability through inheritance, packages and interfaces
- To solve problems using java collection framework and I/O classes.
- To develop applications by using parallel streams for better performance.
- To develop applets for web applications.
- To build GUIs and handle events generated by user interactions.
- To use the JDBC API to access database

### Text Books:

1. Herbert Schildt “Java The complete reference”, 9<sup>th</sup> edition, McGraw Hill Education (India) Pvt. Ltd.
2. Paul Dietel, Harvey Dietel “Java How to Program”, 10<sup>th</sup> Edition, Pearson Education.

### REFERENCE BOOKS:

1. T. Budd “Understanding Object-Oriented Programming with Java”, updated edition, Pearson Education.
2. Cay S. Horstmann, “Core Java Volume – 1 Fundamentals”, Pearson Education.
3. Sagayaraj, Dennis, Karthik and Gajalakshmi, “Java Programming for core and advanced learners” University Press
4. Y. Daniel Liang, “Introduction to Java programming”, Pearson Education.
5. P. Radha Krishna, “Object Oriented Programming through Java”, University Press.
6. S. Malhotra, S. Chudhary, “Programming in Java”, 2<sup>nd</sup> edition, Oxford Univ. Press.
7. R.A. Johnson, “Java Programming and Object-oriented Application Development”, Cengage Learning.

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR**  
**B.Tech (CSE)– II-I Sem**

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## (19A05304T) PYTHON PROGRAMMING

### Course Objectives:

- To learn the fundamentals of Python
- To elucidate problem-solving using a Python programming language
- To introduce a function-oriented programming paradigm through python
- To get training in the development of solutions using modular concepts
- To introduce the programming constructs of python

### Unit – I

**Introduction:** What is a program, Running python, Arithmetic operators, Value and Types.

**Variables, Assignments and Statements:** Assignment statements, Script mode, Order of operations, string operations, comments.

**Functions:** Function calls, Math functions, Composition, Adding new Functions, Definitions and Uses, Flow of Execution, Parameters and Arguments, Variables and Parameters are local, Stack diagrams, Fruitful Functions and Void Functions, Why Functions.

#### Unit Outcomes:

Student should be able to

1. List the basic constructs of Python.
2. Solve the problems by applying modularity principle.

### Unit – II

**Case study:** The turtle module, Simple Repetition, Encapsulation, Generalization, Interface design, Refactoring, docstring.

**Conditionals and Recursion:** floor division and modulus, Boolean expressions, Logical operators, Conditional execution, Alternative execution, Chained conditionals, Nested conditionals, Recursion, Infinite Recursion, Keyboard input.

**Fruitful Functions:** Return values, Incremental development, Composition, Boolean functions, More recursion, Leap of Faith, Checking types,

#### Unit Outcomes:

Student should be able to

- Apply the conditional execution of the program.
- Apply the principle of recursion to solve the problems.

### Unit – III

**Iteration:** Reassignment, Updating variables, The while statement, Break, Square roots, Algorithms.

**Strings:** A string is a sequence, len, Traversal with a for loop, String slices, Strings are immutable, Searching, Looping and Counting, String methods, The in operator, String comparison.

**Case Study:** Reading word lists, Search, Looping with indices.

**Lists:** List is a sequence, Lists are mutable, Traversing a list, List operations, List slices, List methods, Map filter and reduce, Deleting elements, Lists and Strings, Objects and values, Aliasing, List arguments.

**Unit Outcomes:**

Student should be able to

- Use the data structure list.
- Design programs for manipulating strings.

**Unit – IV**

**Dictionaries:** A dictionary is a mapping, Dictionary as a collection of counters, Looping and dictionaries, Reverse Lookup, Dictionaries and lists, Memos, Global Variables.

**Tuples:** Tuples are immutable, Tuple Assignment, Tuple as Return values, Variable-length argument tuples, Lists and tuples, Dictionaries and tuples, Sequences of sequences.

**Files:** Persistence, Reading and writing, Format operator, Filename and paths, Catching exceptions, Databases, Pickling, Pipes, Writing modules.

**Classes and Objects:** Programmer-defined types, Attributes, Instances as Return values, Objects are mutable, Copying.

Classes and Functions:

**Unit Outcomes:**

Student should be able to

- Apply object orientation concepts.
- Use data structure dictionaries.
- Organize data in the form of files.

**Unit – V**

**Classes and Functions:** Time, Pure functions, Modifiers, Prototyping versus Planning

**Classes and Methods:** Object oriented features, Printing objects, The init method, The \_\_str\_\_ method, Operator overloading, Type-based Dispatch, Polymorphism, Interface and Implementation

**Inheritance:** Card objects, Class attributes, Comparing cards, decks, Printing the Deck, Add Remove shuffle and sort, Inheritance, Class diagrams, Data encapsulation.

**The Goodies:** Conditional expressions, List comprehensions, Generator expressions, any and all, Sets, Counters, defaultdict, Named tuples, Gathering keyword Args,

**Unit Outcomes:**

Student should be able to

- Plan programs using object orientation approach.
- Illustrate the principle of inheritance.

**Course Outcomes:**

Student should be able to

- Apply the features of Python language in various real applications.
- Select appropriate data structure of Python for solving a problem.
- Design object oriented programs using Python for solving real-world problems.
- Apply modularity to programs.

**Text books:**

1. Allen B. Downey, “Think Python”, 2<sup>nd</sup> edition, SPD/O’Reilly, 2016.

**Reference Books:**

1. Martin C.Brown, “The Complete Reference: Python”, McGraw-Hill, 2018.
2. Kenneth A. Lambert, B.L. Juneja, “Fundamentals of Python”, CENGAGE, 2015.
3. R. Nageswara Rao, “Core Python Programming”, 2<sup>nd</sup> edition, Dreamtech Press, 2019

**(19A52301) UNIVERSAL HUMAN VALUES 2: UNDERSTANDING HARMONY**  
(Common to all)

**Introduction:**

This course discusses the role of human values in one's family. It, very briefly, touches issues related to their role in the society and the nature, which needs to be discussed at length in one more semester for which the foundation course names as "H-102 Universal Human Values 2 : "Understanding Harmony" is designed which may be covered in their III or IV Semester.

In the Induction Program, students would get an initial exposure to human values through Universal Human Values–I. This exposure is to be augmented by this compulsory full semester foundation course.

**Course Objective:**

The objective of the course is four fold:

- Development of a holistic perspective based on self-exploration about themselves (human being), family, society and nature/existence.
- Understanding (or developing clarity) of the harmony in the human being, family, society and nature/existence
- Strengthening of self-reflection.
- Development of commitment and courage to act.

**COURSE TOPICS:**

The course has 28 lectures and 14 practice sessions in 5 modules:

**Unit 1:**

**Course Introduction - Need, Basic Guidelines, Content and Process for Value Education**

- Purpose and motivation for the course, recapitulation from Universal Human Values-I
- Self-Exploration–what is it? - Its content and process; 'Natural Acceptance' and Experiential Validation- as the process for self-exploration
- Continuous Happiness and Prosperity- A look at basic Human Aspirations
- Right understanding, Relationship and Physical Facility- the basic requirements for fulfilment of aspirations of every human being with their correct priority
- Understanding Happiness and Prosperity correctly- A critical appraisal of the current scenario
- Method to fulfil the above human aspirations: understanding and living in harmony

at various levels.

Include practice sessions to discuss natural acceptance in human being as the innate acceptance for living with responsibility (living in relationship, harmony and co-existence) rather than as arbitrariness in choice based on liking-disliking

## **Unit 2:**

### **Understanding Harmony in the Human Being - Harmony in Myself!**

- Understanding human being as a co-existence of the sentient 'I' and the material 'Body'
- Understanding the needs of Self ('I') and 'Body' - happiness and physical facility
- Understanding the Body as an instrument of 'I' (I being the doer, seer and enjoyer)
- Understanding the characteristics and activities of 'I' and harmony in 'I'
- Understanding the harmony of I with the Body: Sanyam and Health; correct appraisal of Physical needs, meaning of Prosperity in detail
- Programs to ensure Sanyam and Health.

Include practice sessions to discuss the role others have played in making material goods available to me. Identifying from one's own life. Differentiate between prosperity and accumulation. Discuss program for ensuring health vs dealing with disease

## **Unit 3:**

### **Understanding Harmony in the Family and Society- Harmony in Human- Human Relationship**

- Understanding values in human-human relationship; meaning of Justice (nine universal values in relationships) and program for its fulfilment to ensure mutual happiness; Trust and Respect as the foundational values of relationship
- Understanding the meaning of Trust; Difference between intention and competence
- Understanding the meaning of Respect, Difference between respect and differentiation; the other salient values in relationship
- Understanding the harmony in the society (society being an extension of family): Resolution, Prosperity, fearlessness (trust) and co-existence as comprehensive Human Goals
- Visualizing a universal harmonious order in society- Undivided Society, Universal Order- from family to world family.

Include practice sessions to reflect on relationships in family, hostel and institute as extended family, real life examples, teacher-student relationship, goal of education etc. Gratitude as a universal value in relationships. Discuss with scenarios. Elicit examples from students' lives

#### **Unit 4:**

#### **Understanding Harmony in the Nature and Existence - Whole existence as Coexistence**

- Understanding the harmony in the Nature
- Interconnectedness and mutual fulfilment among the four orders of nature- recyclability and self-regulation in nature
- Understanding Existence as Co-existence of mutually interacting units in all-pervasive space
- Holistic perception of harmony at all levels of existence.

Include practice sessions to discuss human being as cause of imbalance in nature (film “Home” can be used), pollution, depletion of resources and role of technology etc.

#### **Unit 5:**

#### **Implications of the above Holistic Understanding of Harmony on Professional Ethics**

- Natural acceptance of human values
- Definitiveness of Ethical Human Conduct
- Basis for Humanistic Education, Humanistic Constitution and Humanistic Universal Order
- Competence in professional ethics: a. Ability to utilize the professional competence for augmenting universal human order b. Ability to identify the scope and characteristics of people friendly and eco-friendly production systems, c. Ability to identify and develop appropriate technologies and management patterns for above production systems.
- Case studies of typical holistic technologies, management models and production systems
- Strategy for transition from the present state to Universal Human Order: a. At the level of individual: as socially and ecologically responsible engineers, technologists and managers b. At the level of society: as mutually enriching institutions and organizations
- Sum up.

Include practice Exercises and Case Studies will be taken up in Practice (tutorial) Sessions eg. To discuss the conduct as an engineer or scientist etc.

#### **Text Book**



1. R R Gaur, R Asthana, G P Bagaria, “A Foundation Course in Human Values and Professional Ethics”, 2<sup>nd</sup> Revised Edition, Excel Books, New Delhi, 2019. ISBN 978-93-87034-47-1
2. R R Gaur, R Asthana, G P Bagaria, “Teachers’ Manual for A Foundation Course in Human Values and Professional Ethics”, 2<sup>nd</sup> Revised Edition, Excel Books, New Delhi, 2019. ISBN 978-93-87034-53-2

### **Reference Books**

1. Jeevan Vidya: Ek Parichaya, A Nagaraj, Jeevan Vidya Prakashan, Amar kantik, 1999.
2. A. N. Tripathi, “Human Values”, New Age Intl. Publishers, New Delhi, 2004.
3. The Story of Stuff (Book).
4. Mohandas Karamchand Gandhi “The Story of My Experiments with Truth”
5. E. F. Schumacher. “Small is Beautiful”
6. Slow is Beautiful –Cecile Andrews
7. J C Kumarappa “Economy of Permanence”
8. Pandit Sunderlal “Bharat Mein Angreji Raj”
9. Dharampal, “Rediscovering India”
10. Mohandas K. Gandhi, “Hind Swaraj or Indian Home Rule”
11. India Wins Freedom - Maulana Abdul Kalam Azad
12. Vivekananda - Romain Rolland(English)
13. Gandhi - Romain Rolland (English)

### **MODE OF CONDUCT (L-T-P-C 2-1-0-2)**

Lecture hours are to be used for interactive discussion, placing the proposals about the topics at hand and motivating students to reflect, explore and verify them. Tutorial hours are to be used for practice sessions.

While analyzing and discussing the topic, the faculty mentor’s role is in pointing to essential elements to help in sorting them out from the surface elements. In other words, help the students explore the important or critical elements.

In the discussions, particularly during practice sessions (tutorials), the mentor encourages the student to connect with one’s own self and do self-observation, self-reflection and self-exploration.

Scenarios may be used to initiate discussion. The student is encouraged to take up “ordinary” situations rather than “extra-ordinary” situations. Such observations and their analyses are shared and discussed with other students and faculty mentor, in a group sitting.

Tutorials (experiments or practical) are important for the course. The difference is that the laboratory is everyday life, and practicals are how you behave and work in real life. Depending on the nature of topics, worksheets, home assignments and/or activities are included. The practice sessions (tutorials) would also provide support to a student in performing actions commensurate to his/her beliefs. It is intended that this would lead to development of commitment, namely behaving and working based on basic human values.

### **OUTCOME OF THE COURSE:**

By the end of the course,

- Students are expected to become more aware of themselves, and their surroundings (family, society, nature)
- They would become more responsible in life, and in handling problems with sustainable solutions, while keeping human relationships and human nature in mind.
- They would have better critical ability.
- They would also become sensitive to their commitment towards what they have understood (human values, human relationship and human society).
- It is hoped that they would be able to apply what they have learnt to their own self in different day-to-day settings in real life, at least a beginning would be made in this direction.

**(19A05302P) DATABASE MANAGEMENT SYSTEMS LABORATORY**

**(Common to CSE& IT)**

**Course Objectives:**

- To implement the basic knowledge of SQL queries and relational algebra.
- To construct database models for different database applications.
- To apply normalization techniques for refining of databases.
- To practice various triggers, procedures, and cursors using PL/SQL.
- To design and implementation of a database for an organization

**Week-1: CREATION OF TABLES**

1. Create a table called Employee with the following structure.

Name	Type
Empno	Number
Ename	Varchar2(20)
Job	Varchar2(20)
Mgr	Number
Sal	Number

- a. Add a column commission with domain to the Employee table.
- b. Insert any five records into the table.
- c. Update the column details of job
- d. Rename the column of Employ table using alter command.
- e. Delete the employee whose empno is 19.

2. Create department table with the following structure.

Name	Type
Deptno	Number
Deptname	Varchar2(20)
location	Varchar2(20)

- a. Add column designation to the department table.
- b. Insert values into the table.
- c. List the records of emp table grouped by dept no.
- d. Update the record where dept no is 9.
- e. Delete any column data from the table

3. Create a table called Customer table

<b>Name</b>	<b>Type</b>
Cust name	Varchar2(20)
Cust street	Varchar2(20)
Cust city	Varchar2(20)

- a. Insert records into the table.
- b. Add salary column to the table.
- c. Alter the table column domain.
- d. Drop salary column of the customer table.
- e. Delete the rows of customer table whose ust\_city is 'hyd'.
- f. Create a table called branch table.

<b>Name</b>	<b>Type</b>
Branch name	Varchar2(20)
Branch city	Varchar2(20)
asserts	Number

4. Increase the size of data type for asserts to the branch.
  - a. Add and drop a column to the branch table.
  - b. Insert values to the table.
  - c. Update the branch name column
  - d. Delete any two columns from the table

5. Create a table called sailor table

<b>Name</b>	<b>Type</b>
Sid	Number
Sname	Varchar2(20)
rating	Varchar2(20)

- a. Add column age to the sailortable.

- b. Insert values into the sailortable.
  - c. Delete the row with rating>8.
  - d. Update the column details ofsailor.
  - e. Insert null values into thetable.
6. Create a table called reserves table

<b>Name</b>	<b>Type</b>
Boat id	Integer
sid	Integer
day	Integer

- a. Insert values into the reserves table.
- b. Add column time to the reserves table.
- c. Alter the column day data type to date.
- d. Drop the column time in the table.`
- e. Delete the row of the table with some condition.

## **Week-2: QUERIES USING DDL AND DML**

1.
  - a. Create a user and grant all permissions to the user.
  - b. Insert the any three records in the employee table and use rollback. Check the result.
  - c. Add primary key constraint and not null constraint to the employee table.
  - d. Insert null values to the employee table and verify the result.
2.
  - a. Create a user and grant all permissions to the user.
  - b. Insert values in the department table and use commit.
  - c. Add constraints like unique and not null to the department table.
  - d. Insert repeated values and null values into the table.
3.
  - a. Create a user and grant all permissions to the user.
  - b. Insert values into the table and use commit.
  - c. Delete any three records in the department table and use rollback.
  - d. Add constraint primary key and foreign key to the table.
4.
  - a. Create a user and grant all permissions to the user.
  - b. Insert records in the sailor table and use commit.
  - c. Add save point after insertion of records and verify save point.
  - d. Add constraints not null and primary key to the sailor table.
5.
  - a. Create a user and grant all permissions to the user.
  - b. Use revoke command to remove user permissions.
  - c. Change password of the user created.
  - d. Add constraint foreign key and no tnnull.
6.
  - a. Create a user and grant all permissions to the user.
  - b. Update the table reserves and use save point and rollback.
  - c. Add constraint primary key , foreign key and not null to the reserves table
  - d. Delete constraint not null to the table column

### Week-3:QUERIES USING AGGREGATE FUNCTIONS

1.
  - a. By using the group by clause, display the names who belongs to dept no 10 along with average salary.
  - b. Display lowest paid employee details under each department.
  - c. Display number of employees working in each department and their department number.
  - d. Using built in functions, display number of employees working in each department and their department name from dept table. Insert dept name to dept table and insert dept name for each row, do the required thing specified above.
  - e. List all employees which start with either B or C.
  - f. Display only these ename of employees where the maximum salary is greater than or equal to 5000.
2.
  - a. Calculate the average salary for each different job.
  - b. Show the average salary of each job excluding manager.
  - c. Show the average salary for all departments employing more than three people.
  - d. Display employees who earn more than the lowest salary in department 30
  - e. Show that value returned by sign (n)function.
  - f. How many days between day of birth to current date
3.
  - a. Show that two substring as single string.
  - b. List all employee names, salary and 15% rise in salary.
  - c. Display lowest paid emp details under each manager
  - d. Display the average monthly salary bill for each deptno.
  - e. Show the average salary for all departments employing more than two people.
  - f. By using the group by clause, display the eid who belongs to dept no 05 along with a average salary.
4.
  - a. Count the number of employees in department20
  - b. Find the minimum salary earned by clerk.
  - c. Find minimum, maximum, average salary of all employees.
  - d. List the minimum and maximum salaries for each job type.
  - e. List the employee names in descending order.
  - f. List the employee id, names in ascending order by empid.
5.
  - a. Find the sids ,names of sailors who have reserved all boats called "INTERLAKE  
Find the age of youngest sailor who is eligible to vote for each rating level with at least two such sailors.
  - b. Find the sname , bid and reservation date for each reservation.
  - c. Find the ages of sailors whose name begin and end with B and has at least 3characters.
  - d. List in alphabetic order all sailors who have reserved red boat.
  - e. Find the age of youngest sailor for each rating level.
6.
  - a. List the Vendors who have delivered products within 6 months from or derdate.
  - b. Display the Vendor details who have supplied both Assembled and Subparts.

- c. Display the Sub parts by grouping the Vendor type (Local or Non Local).
- d. Display the Vendor details in ascending order.
- e. Display the Sub part which costs more than any of the Assembled parts.
- f. Display the second maximum cost Assembled part

#### **Week-4: PROGRAMS ON PL/SQL**

1. a. Write a PL/SQL program to swap two numbers.
- b. Write a PL/SQL program to find the largest of three numbers.
2. a. Write a PL/SQL program to find the total and average of 6 subjects and display the grade.
- b. Write a PL/SQL program to find the sum of digits in a given number.
3. a. Write a PL/SQL program to display the number in reverse order.
- b. Write a PL/SQL program to check whether the given number is prime or not.
4. a. Write a PL/SQL program to find the factorial of a given number.
- b. Write a PL/SQL code block to calculate the area of a circle for a value of radius varying from 3 to 7. Store the radius and the corresponding values of calculated area in an empty table named areas, consisting of two columns radius and area.
5. a. Write a PL/SQL program to accept a string and remove the vowels from the string. (When 'hello' passed to the program it should display 'Hll' removing e and o from the word Hello).
- b. Write a PL/SQL program to accept a number and a divisor. Make sure the divisor is less than or equal to 10. Else display an error message. Otherwise Display the remainder in words.

#### **Week-5: PROCEDURES AND FUNCTIONS**

1. Write a function to accept employee number as parameter and return Basic +HRA together as single column.
2. Accept year as parameter and write a Function to return the total net salary spent for a given year.
3. Create a function to find the factorial of a given number and hence find NCR.
4. Write a PL/SQL block to print prime Fibonacci series using local functions.
5. Create a procedure to find the lucky number of a given birth date.
6. Create function to the reverse of given number

#### **Week-6: TRIGGERS**

1. Create a row level trigger for the customers table that would fire for INSERT or UPDATE or DELETE operations performed on the CUSTOMERS table. This trigger will display the salary difference between the old values and new values:

CUSTOMERS table:

ID	NAME	AGE	ADDRESS	SALARY
1	Alive	24	Khammam	2000
2	Bob	27	Kadappa	3000
3	Catri	25	Guntur	4000
4	Dena	28	Hyderabad	5000
5	Eeshwar	27	Kurnool	6000
6	Farooq	28	Nellur	7000

2. Creation of insert trigger, delete trigger, update trigger practice triggers using the passenger database.

Passenger( Passport\_id INTEGER PRIMARY KEY, Name VARCHAR (50) NotNULL, Age Integer Not NULL, Sex Char, Address VARCHAR (50) NotNULL);

- a. Write a Insert Trigger to check the Passport\_id is exactly six digits ornot.
  - b. Write a trigger on passenger to display messages ‘1 Record is inserted’, ‘1 record is deleted’, ‘1 record is updated’ when insertion, deletion and updation are done on passengerrespectively.
3. Insert row in employee table using Triggers. Every trigger is created with name any trigger have same name must be replaced by new name. These triggers can raised before insert, update or delete rows on data base. The main difference between a trigger and a stored procedure is that the former is attached to a table and is only fired when an INSERT, UPDATE or DELETEoccurs.
  4. Convert employee name into uppercase whenever an employee record is inserted or updated. Trigger to fire before the insert orupdate.
  5. Trigger before deleting a record from emp table. Trigger will insert the row to be deleted into table called delete \_emp and also record user who has deleted the record and date and time ofdelete.
  6. Create a transparent audit system for a table CUST\_MSTR. The system must keep track of the records that are being deleted or updated

## Week-7: PROCEDURES

1. Create the procedure for palindrome of given number.
2. Create the procedure for GCD: Program should load two registers with two Numbers and then apply the logic for GCD of two numbers. GCD of two numbers is performed by dividing the greater number by the smaller number till the remainder is zero. If it is zero, the divisor is the GCD if not the remainder and the divisors of the previous division are the new set of two numbers. The process is repeated by dividing greater of the two numbers by the smaller number till the remainder is zero and GCD isfound.
3. Write the PL/SQL programs to create the procedure for factorial of givennumber.
4. Write the PL/SQL programs to create the procedure to find sum of N naturalnumber.
5. Write the PL/SQL programs to create the procedure to find Fibonacciseries.
6. Write the PL/SQL programs to create the procedure to check the given number is perfect ornot



## **Week-8: CURSORS**

1. Write a PL/SQL block that will display the name, dept no, salary of fist highest paid employees.
2. Update the balance stock in the item master table each time a transaction takes place in the item transaction table. The change in item master table depends on the item id is already present in the item master then update operation is performed to decrease the balance stock by the quantity specified in the item transaction in case the item id is not present in the item master table then the record is inserted in the item master table.
3. Write a PL/SQL block that will display the employee details along with salary using cursors.
4. To write a Cursor to display the list of employees who are working as a Managers or Analyst.
5. To write a Cursor to find employee with given job and dept no.
6. Write a PL/SQL block using implicit cursor that will display message, the salaries of all the employees in the 'employee' table are updated. If none of the employee's salary are updated we get a message 'None of the salaries were updated'. Else we get a message like for example, 'Salaries for 1000 employees are updated' if there are 1000 rows in 'employee' table

## **Week-9: CASE STUDY: BOOK PUBLISHING COMPANY**

A publishing company produces scientific books on various subjects. The books are written by authors who specialize in one particular subject. The company employs editors who, not necessarily being specialists in a particular area, each take sole responsibility for editing one or more publications.

A publication covers essentially one of the specialist subjects and is normally written by a single author. When writing a particular book, each author works with on editor, but may submit another work for publication to be supervised by other editors. To improve their competitiveness, the company tries to employ a variety of authors, more than one author being a specialist in a particular subject for the above case study, do the following:

1. Analyze the data required.
2. Normalize the attributes.

Create the logical data model using E-R diagrams

## **Week-10: CASE STUDY GENERAL HOSPITAL**

A General Hospital consists of a number of specialized wards (such as Maternity, Pediatric, Oncology, etc). Each ward hosts a number of patients, who were admitted on the recommendation of their own GP and confirmed by a consultant employed by the Hospital. On admission, the personal details of every patient are recorded. A separate register is to be held to store the information of the tests undertaken and the results of a prescribed treatment.

A number of tests may be conducted for each patient. Each patient is assigned to one leading consultant but may be examined by another doctor, if required. Doctors are specialists in some branch of medicine and may be leading consultants for a number of patients, not necessarily from the same ward. For the above case study, do the following.

1. Analyze the data required.
2. Normalize the attributes.

Create the logical data model using E-R diagrams

### **Week-11: CASE STUDY: CAR RENTAL COMPANY**

A database is to be designed for a car rental company. The information required includes a description of cars, subcontractors (i.e. garages), company expenditures, company revenues and customers. Cars are to be described by such data as: make, model, year of production, engine size, fuel type, number of passengers, registration number, purchase price, purchase date, rent price and insurance details. It is the company policy not to keep any car for a period exceeding one year. All major repairs and maintenance are done by subcontractors (i.e. franchised garages), with whom CRC has long-term agreements. Therefore the data about garages to be kept in the database includes garage names, addresses, range of services and the like. Some garages require payments immediately after a repair has been made; with others CRC has made arrangements for credit facilities. Company expenditures are to be registered for all outgoings connected with purchases, repairs, maintenance, insurance etc. Similarly the cash inflow coming from all sources: Car hire, car sales, insurance claims must be kept of file. CRC maintains a reasonably stable client base. For this privileged category of customers special credit card facilities are provided. These customers may also book in advance a particular car. These reservations can be made for any period of time up to one month. Casual customers must pay a deposit for an estimated time of rental, unless they wish to pay by credit card. All major credit cards are accepted. Personal details such as name, address, telephone number, driving license, number about each customer are kept in the database. For the above case study, do the following:

1. Analyze the data required.
2. Normalize the attributes.

Create the logical data model using E-R diagrams

### **Week-12: CASE STUDY: STUDENT PROGRESS MONITORING SYSTEM**

A database is to be designed for a college to monitor students' progress throughout their course of study. The students are reading for a degree (such as BA, BA (Hons) M.Sc., etc) within the framework of the modular system. The college provides a number of modules, each being characterized by its code, title, credit value, module leader, teaching staff and the department they come from. A module is coordinated by a module leader who shares teaching duties with one or more lecturers. A lecturer may teach (and be a module leader for) more than one module. Students are free to choose any module they wish but the following rules must be observed: Some modules require pre- requisites modules and some degree programmes have compulsory modules. The database is also to contain some information about

students including their numbers, names, addresses, degree they read for, and their past performance

i.e. modules taken and examination results. For the above case study, do the following:

1. Analyze the data required.
2. Normalize the attributes.
3. Create the logical data model i.e., ER diagrams.
4. Comprehend the data given in the case study by creating respective tables with primary keys and foreign keys wherever required.
5. Insert values into the tables created (Be vigilant about Master- Slave tables).
6. Display the Students who have taken M.Sc course
7. Display the Module code and Number of Modules taught by each Lecturer.
8. Retrieve the Lecturer names who are not Module Leaders.
9. Display the Department name which offers 'English' module.
10. Retrieve the Prerequisite Courses offered by every Department (with Department names).
11. Present the Lecturer ID and Name who teaches 'Mathematics'.
12. Discover the number of years a Module is taught.
13. List out all the Faculties who work for 'Statistics' Department.
14. List out the number of Modules taught by each Module Leader.
15. List out the number of Modules taught by a particular Lecturer.
16. Create a view which contains the fields of both Department and Module tables.  
(Hint- The fields like Module code, title, credit, Department code and its name).
17. Update the credits of all the prerequisite courses to 5. Delete the Module 'History' from the Module table.

### **Unit Outcomes:**

Students should be able to

1. Design database for any real world problem
2. Implement PL/SQL programs
3. Define SQL queries
4. Decide the constraints
5. Investigate for data inconsistency

### **Reference Books:**

1. Ramez Elmasri, Shamkant, B. Navathe, "Database Systems", Pearson Education, 6<sup>th</sup> Edition, 2013.
2. Peter Rob, Carles Coronel, "Database System Concepts", Cengage Learning, 7th Edition, 2008.

### **Web References:**

<http://www.scoopworld.in>

**SOFTWARE AND HARDWARE REQUIREMENTS FOR A BATCH OF 24 STUDENTS:**

HARDWARE: Desktop Computer Systems: 24 nos

SOFTWARE: Oracle 11g.

**(19A05303P) OBJECT ORIENTED PROGRAMMING THROUGH JAVA LAB**

**(Common to CSE & IT)**

**Course Objectives**

- To introduce the concepts of Java.
- To Practice object-oriented programs and build java applications.
- To implement java programs for establishing interfaces.
- To implement sample programs for developing reusable software components.
- To establish database connectivity in java and implement GUI applications.

**Week-1**

a. Installation of Java software, study of any Integrated development environment, Use Eclipse or Netbean platform and acquaint with the various menus. Create a test project, add a test class and run it. See how you can use auto suggestions, auto fill. Try code formatter and code refactoring like renaming variables, methods and classes. Try debug step by step with java program to find prime numbers between 1 to n.

b. Write a Java program that prints all real solutions to the quadratic equation  $ax^2+bx+c=0$ . Read in a, b, c and use the quadratic formula.

c. Develop a Java application to generate Electricity bill. Create a class with the following members: Consumer no., consumer name, previous month reading, current month reading, type of EB connection

(i.e domestic or commercial). Commute the bill amount using the following tariff.

If the type of the EB connection is domestic, calculate the amount to be paid as follows:

- First 100 units - Rs. 1 per unit
- 101-200 units - Rs. 2.50 per unit
- 201 -500 units - Rs. 4 per unit
- > 501 units - Rs. 6 per unit

If the type of the EB connection is commercial, calculate the amount to be paid as follows:

- First 100 units - Rs. 2 per unit
- 101-200 units - Rs. 4.50 per unit
- 201 -500 units - Rs. 6 per unit
- > 501 units - Rs. 7 per unit

d. Write a Java program to multiply two given matrices.

**Week-2**

a. Write Java program on use of inheritance, preventing inheritance using final, abstract classes.

b. Write Java program on dynamic binding, differentiating method overloading and overriding.

c. Develop a java application to implement currency converter (Dollar to INR, EURO to INR, Yen) using Interfaces.

### **Week-3**

a. Write Java program that inputs 5 numbers, each between 10 and 100 inclusive. As each number is read display it only if it's not a duplicate of any number already read display the complete set of unique values input after the user enters each new value.

b. Write a Java Program to create an abstract class named Shape that contains two integers and an empty method named print Area(). Provide three classes named Rectangle, Triangle and Circle such that each one of the classes extends the class Shape. Each one of the classes contains only the method print Area () that prints the area of the given shape.

c. Write a Java program to read the time intervals (HH:MM) and to compare system time if the system Time between your time intervals print correct time and exit else try again to repute the same thing. By using String Toknizer class.

### **Week-4**

a. Write a Java program to implement user defined exception handling.

b. Write java program that inputs 5 numbers, each between 10 and 100 inclusive. As each number is read display it only if it's not a duplicate of any number already read. Display the complete set of unique values input after the user enters each new value.

### **Week-5**

a. Write a Java program that creates a user interface to perform integer division. The user enters two numbers in the text fields, Num1 and Num2. The division of Num1 and Num2 is displayed in the Result field when the Divide button is clicked. If Num1 and Num2 were not integers, the program would throw a Number Format Exception. If Num2 were zero, the program would throw an Arithmetic Exception Display the exception in a message dialog box.

b. Write a Java program that creates three threads. First thread displays —Good Morning| every one second, the second thread displays —Hello| every two seconds and the third thread displays —Welcome| every three seconds.

### **Week-6**

a. Write a java program to split a given text file into n parts. Name each part as the name of the original file followed by .part where n is the sequence number of the part file.

b. Write a Java program that reads a file name from the user, displays information about whether the file exists, whether the file is readable, or writable, the type of file and the length of the file in bytes.

### **Week-7**

- a. Write a java program that displays the number of characters, lines and words in a text file.
- b. Write a java program that reads a file and displays the file on the screen with line number before each line.

### **Week-8**

- a. Write a Java program that correctly implements producer consumer problem using the concept of inter thread communication.
- b. Develop a Java application for stack operation using Buttons and JOptionPane input and Message dialog box.
- c. Develop a Java application to perform Addition, Division, Multiplication and subtraction using JOptionPane dialog Box and Text fields.

### **Week-9**

- a. Develop a Java application for the blinking eyes and mouth should open while blinking.
- b. Develop a Java application that simulates a traffic light. The program lets the user select one of three lights: Red, Yellow or Green with radio buttons. On selecting a button an appropriate message with —STOP| or —READY| or |GO| should appear above the buttons in selected color. Initially, there is no message shown.

### **Week-10**

- a. Develop a Java application to implement the opening of a door while opening man should present before hut and closing man should disappear.
- b. Develop a Java application by using JTextField to read decimal value and converting a decimal number into binary number then print the binary value in another JTextField.

### **Week-11**

- a. Develop a Java application that handles all mouse events and shows the event name at the center of the window when a mouse event is fired. Use adapter classes.
- b. Develop a Java application to demonstrate the key event handlers.

### **Week-12**

- a. Develop a Java application to find the maximum value from the given type of elements using a generic function.
- b. Develop a Java application that works as a simple calculator. Use a grid layout to arrange buttons for the digits and for the +, -, \*, % operations. Add a text field to display the result.
- c. Develop a Java application for handling mouse events.

## **Week-13**

a. Develop a Java application to establish a JDBC connection, create a table student with properties name, register number, mark1, mark2, mark3. Insert the values into the table by using the java and display the information of the students at front end.

### **Unit Outcomes:**

On successful completion of this laboratory students will be able to:

- Recognize the Java programming environment.
- Develop efficient programs using multithreading.
- Design reliable programs using Java exception handling features.
- Extend the programming functionality supported by Java.
- Select appropriate programming construct to solve a problem.



(19A05304P) PYTHON PROGRAMMING LABORATORY

(Common to CSE & IT)

**Course Objectives:**

- To train the students in solving computational problems
- To elucidate solving mathematical problems using Python programming language
- To understand the fundamentals of Python programming concepts and its applications.
- To understand the object-oriented concepts using Python in problem solving.

**Laboratory Experiments**

1. Install Python Interpreter and use it to perform different Mathematical Computations. Try to do all the operations present in a Scientific Calculator
2. Write a function that draws a grid like the following:

```
+-----+-----+
|         |         |
|         |         |
|         |         |
|         |         |
+-----+-----+
|         |         |
|         |         |
|         |         |
|         |         |
+-----+-----+
```

3. Write a function that draws a Pyramid with # symbols

```
      #
     ###
    #####
   #####
  #####
 .
 .
 .
```

Up to 15 hashes at the bottom

4. Using turtles concept draw a wheel of your choice
5. Write a program that draws Archimedean Spiral

6. The letters of the alphabet can be constructed from a moderate number of basic elements, like vertical and horizontal lines and a few curves. Design an alphabet that can be drawn with a minimal number of basic elements and then write functions that draw the letters. The alphabet can belong to any Natural language excluding English. You should consider at least Ten letters of the alphabet.
7. The time module provides a function, also named time that returns the current Greenwich Mean Time in “the epoch”, which is an arbitrary time used as a reference point. On UNIX systems, the epoch is 1 January 1970.

```
>>> import time
>>> time.time()
1437746094.5735958
```

Write a script that reads the current time and converts it to a time of day in hours, minutes, and seconds, plus the number of days since the epoch.

8. Given  $n+r+1 \leq 2^r$ .  $n$  is the input and  $r$  is to be determined. Write a program which computes minimum value of  $r$  that satisfies the above.
9. Write a program that evaluates Ackermann function
10. The mathematician Srinivasa Ramanujan found an infinite series that can be used to generate a numerical approximation of  $1/\pi$  :  
Write a function called estimate\_pi that uses this formula to compute and return an estimate of  $\pi$ .

$$\frac{1}{\pi} = \frac{2\sqrt{2}}{9801} \sum_{k=0}^{\infty} \frac{(4k)!(1103 + 26390k)}{(k!)^4 396^{4k}}$$

It should use a while loop to compute terms of the summation until the last term is smaller than  $1e-15$  (which is Python notation for  $10^{-15}$ ). You can check the result by comparing it to `math.pi`.

11. Choose any five built-in string functions of C language. Implement them on your own in Python. You should not use string related Python built-in functions.
12. Given a text of characters, Write a program which counts number of vowels, consonants and special characters.
13. Given a word which is a string of characters. Given an integer say ‘n’, Rotate each character by ‘n’ positions and print it. Note that ‘n’ can be positive or negative.
14. Given rows of text, write it in the form of columns.
15. Given a page of text. Count the number of occurrences of each letter (Assume case insensitivity and don’t consider special characters). Draw a histogram to represent the same
16. Write program which performs the following operations on list’s. Don’t use built-in functions
  - a) Updating elements of a list
  - b) Concatenation of list’s
  - c) Check for member in the list

- d) Insert into the list
- e) Sum the elements of the list
- f) Push and pop element of list
- g) Sorting of list
- h) Finding biggest and smallest elements in the list
- i) Finding common elements in the list

18. Write a program that reads a file, breaks each line into words, strips whitespace and punctuation from the words, and converts them to lowercase.

19. Go to Project Gutenberg (<http://gutenberg.org>) and download your favorite out-of-copyright book in plain text format. Read the book you downloaded, skip over the header information at the beginning of the file, and process the rest of the words as before. Then modify the program to count the total number of words in the book, and the number of times each word is used. Print the number of different words used in the book. Compare different books by different authors, written in different eras.

20. Go to Project Gutenberg (<http://gutenberg.org>) and download your favorite out-of-copyright book in plain text format. Write a program that allows you to replace words, insert words and delete words from the file.

21. Consider all the files on your PC. Write a program which checks for duplicate files in your PC and displays their location. Hint: If two files have the same checksum, they probably have the same contents.

22. Consider turtle object. Write functions to draw triangle, rectangle, polygon, circle and sphere. Use object oriented approach.

23. Write a program illustrating the object oriented features supported by Python.

24. Design a Python script using the Turtle graphics library to construct a turtle bar chart representing the grades obtained by N students read from a file categorising them into distinction, first class, second class, third class and failed.

25. Design a Python script to determine the difference in date for given two dates in YYYY:MM:DD format( $0 \leq \text{YYYY} \leq 9999$ ,  $1 \leq \text{MM} \leq 12$ ,  $1 \leq \text{DD} \leq 31$ ) following the leap year rules.

26. Design a Python Script to determine the time difference between two given times in HH:MM:SS format. ( $0 \leq \text{HH} \leq 23$ ,  $0 \leq \text{MM} \leq 59$ ,  $0 \leq \text{SS} \leq 59$ )

### **Unit Outcomes:**

Student should be able to

- Design solutions to mathematical problems.
- Organize the data for solving the problem.
- Develop Python programs for numerical and text based problems.
- Select appropriate programming construct for solving the problem.
- Illustrate object oriented concepts.

## Reference Books:

1. Peter Wentworth, Jeffrey Elkner, Allen B. Downey and Chris Meyers, “How to Think Like a Computer Scientist: Learning with Python 3”, 3<sup>rd</sup> edition, Available at <http://www.ict.ru.ac.za/Resources/cspw/thinkcspy3/thinkcspy3.pdf>
2. Paul Barry, “Head First Python a Brain Friendly Guide” 2<sup>nd</sup> Edition, O’Reilly, 2016
3. Dainel Y.Chen “Pandas for Everyone Python Data Analysis” Pearson Education, 2019

(19A99301) ENVIRONMENTAL SCIENCE

**Course Objectives:**

- To make the students to get awareness on environment
- To understand the importance of protecting natural resources, ecosystems for future generations and pollution causes due to the day to day activities of human life
- To save earth from the inventions by the engineers.

**UNIT – I**

**Multidisciplinary Nature Of Environmental Studies:** – Definition, Scope and Importance – Need for Public Awareness.

**Natural Resources :** 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 Outcomes**

- To know the importance of public awareness
- To know about the various resources

**UNIT – II**

**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)

**Biodiversity And Its Conservation :** 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-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.

**Course Outcomes:**

- To know about various eco systems and their characteristics
- To know about the biodiversity and its conservation

**UNIT – III**

**Environmental Pollution:** 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

**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.

**Course Outcomes:**

- To know about the various sources of pollution.
- To know about the various sources of solid waste and preventive measures.
- To know about the different types of disasters and their managerial measures.

**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. – 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.

**Course Outcomes:**

- To know about the social issues related to environment and their protection acts.
- To know about the various sources of conservation of natural resources.

- To know about the wild life protection and forest conservation acts.

## UNIT – V

**Human Population And The Environment:** Population growth, variation among nations. Population explosion – Family Welfare Programmes. – 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.

**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, and birds – river, hill slopes, etc..

### Unit Outcomes:

- To know about the population explosion and family welfare programmes.
- To identify the natural assets and related case studies.

### Course Outcomes:

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

- Grasp multidisciplinary nature of environmental studies and various renewable and nonrenewable resources.
- Understand flow and bio-geo- chemical cycles and ecological pyramids.
- Understand various causes of pollution and solid waste management and related preventive measures.
- About the rainwater harvesting, watershed management, ozone layer depletion and waste land reclamation.
- Casus of population explosion, value education and welfare programmes.

### TEXT BOOKS :

1. Text book of Environmental Studies for Undergraduate Courses Erach Bharucha for University Grants Commission, Universities Press.
2. Palaniswamy, “Environmental Studies”, Pearson education
3. S.Azeem Unnisa, “Environmental Studies” Academic Publishing Company
4. K.Raghavan Nambiar, “Text book of Environmental Studies for Undergraduate Courses as per UGC model syllabus”, Scitech Publications(India), Pvt. Ltd.

### REFERENCES :

1. Deeksha Dave and E.Sai Baba Reddy, “Textbook of Environmental Science”, Cengage Publications.
2. M.Anji Reddy, “Text book of Environmental Sciences and Technology”, BS Publication.
3. J.P.Sharma, Comprehensive Environmental studies, Laxmi publications.

4. J. Glynn Henry and Gary W. Heinke, "Environmental Sciences and Engineering", Prentice hall of India Private limited
5. G.R.Chatwal, "A Text Book of Environmental Studies" Himalaya Publishing House
6. Gilbert M. Masters and Wendell P. Ela, "Introduction to Environmental Engineering and Science, Prentice hall of India Private limited.



**(19A54401) NUMBER THEORY AND APPLICATIONS**

(Common to CSE & IT)

**Course Objective:**

This course enables the students to learn the concepts of number theory and its applications to information security.

**Unit-I-Integers, Greatest common divisors and prime Factorization**

The well-ordering property-Divisibility-Representation of integers-Computer operations with integers-Prime numbers-Greatest common divisors-The Euclidean algorithm -The fundamental theorem of arithmetic-Factorization of integers and the Fermat numbers-Linear Diophantine equations

**Unit Outcomes:**

Students will be able to

1. Understand basics of number theory concepts.
2. Solve problems on prime numbers.
3. Understand Euclidean algorithm and its applications.

**Unit-II-Congruences**

Introduction to congruences -Linear congruences-The Chinese remainder theorem-Systems of linear congruences

**Unit Outcomes:**

Students will be able to

1. understand Congruences and its basic properties.
2. understand Chinese remainder theorem and its applications.

**Unit-III Applications of Congruences**

Divisibility tests-The perpetual calendar-Round-robin tournaments-Computer file storage and hashing functions. Wilson's theorem and Fermat's little theorem- Pseudo primes- Euler's theorem- Euler's phi-function- The sum and number of divisors- Perfect numbers and Mersenne primes.

**Unit Outcomes:**

Students will be able to

1. understand divisibility tests.
2. apply the concept of congruences to various applications.
3. understand various theorems on Number theory and its applications.

## **Unit-IV- Finite fields & Primality, factoring**

Finite fields- quadratic residues and reciprocity-Pseudo primes-rho method-fermat factorization and factor bases.

### **Unit Outcomes:**

Students will be able to

1. Understand the terminology of finite fields.
2. Understand rho method and fermat factorization.

## **Unit-V- Cryptology**

Basic terminology-complexity theorem-Character ciphers-Block ciphers-Exponentiation ciphers- Public-key cryptography-Discrete logarithm-Knapsack ciphers- RSA algorithm-Some applications to computer science.

### **Unit Outcomes:**

Students will be able to

1. Understand the terminology of cryptology.
2. Understand different encryption mechanisms.

### **Course Outcomes:**

After the completion of course, student will be able to

- Understand number theory and its properties.
- Understand principles on congruences
- Develop the knowledge to apply various applications
- Develop various encryption methods and its applications.

### **Text Books:**

1. Kenneth H Rosen “Elementary number theory and its applications”, AT & T Information systems & Bell laboratories.
2. Neal Koblitz “ A course in Number theory & Cryptography”, Springer.

### **Reference Books:**

1. Herbert S. Zuckerman, “An Introduction To The Theory Of Numbers”, Hugh L. Montgomery, Ivan Niven, wiley publishers
2. Tom M Apostol “Introduction to Analytic number theory”, Springer
3. VK Krishnan “Elementary number theory”, Universities press

(19A05401) COMPUTER ORGANIZATION  
(CSE & IT)

**Course Objectives:**

- To learn the fundamentals of computer organization and its relevance to classical and modern problems of computer design
- To understand the structure and behavior of various functional modules of a computer.
- To learn the techniques that computers use to communicate with I/O devices
- To acquire the concept of pipelining and exploitation of processing speed.
- To learn the basic characteristics of multiprocessors

UNIT - I

**Basic Structure of Computer:** Computer Types, Functional Units, Basic operational Concepts, Bus Structure, Software, Performance, Multiprocessors and Multicomputer.

**Machine Instructions and Programs:** Numbers, Arithmetic Operations and Programs, Instructions and Instruction Sequencing, Addressing Modes, Basic Input/output Operations, Stacks and Queues, Subroutines, Additional Instructions.

**Unit Outcomes:**

**Student is able to**

- Identify the basic functional units and different ways of interconnecting to form a computer system.
- Illustrate various addressing modes for accessing register and memory operands.
- Describe the instruction sequencing and various types of instructions.

UNIT - II

**Arithmetic:** Addition and Subtraction of Signed Numbers, Design of Fast Adders, Multiplication of Positive Numbers, Signed-operand Multiplication, Fast Multiplication, Integer Division, Floating-Point Numbers and Operations.

**Basic Processing Unit:** Fundamental Concepts, Execution of a Complete Instruction, Multiple-Bus Organization, Hardwired Control, Multi programmed Control.

**Unit Outcomes:**

**Student is able to**

- Outline the arithmetic operations on signed numbers.
- Describe the operations performed on floating point numbers.
- Distinguish between hardwired and micro programmed control units.

### UNIT - III

**The Memory System:** Basic Concepts, Semiconductor RAM Memories, Read-Only Memories, Speed, Size and Cost, Cache Memories, Performance Considerations, Virtual Memories, Memory Management Requirements, Secondary Storage.

**Unit Outcomes:**

**Student is able to**

- Recognize the various types of memories.
- Analyze the performance of cache memory.
- Apply effective memory management strategies.

### UNIT - IV

**Input/Output Organization:** Accessing I/O Devices, Interrupts, Processor Examples, Direct Memory Access, Buses, Interface Circuits, Standard I/O Interfaces.

**Unit Outcomes:**

**Student is able to**

- Examine the basics of I/O data transfer synchronization.
- Analyze the interrupt handling mechanisms of various processors.
- Describe various techniques for I/O data transfer methods.

### UNIT - V

**Pipelining:** Basic Concepts, Data Hazards, Instruction Hazards, Influence on Instruction Sets.

**Large Computer Systems:** Forms of Parallel Processing, Array Processors, The Structure of General-Purpose multiprocessors, Interconnection Networks.

**Unit Outcomes:**

**Student is able to**

- Investigate the use of pipelining and multiple functional units in the design of high-performance processors.
- Design and analyze a high performance processor.
- Describe the interconnection networks for multiprocessors.

**Course Outcomes:**

At end of the course the student will be able to

- Understand computer architecture concepts related to design of modern processors, memories and I/Os
- Identify the hardware requirements for cache memory and virtual memory
- Design algorithms to exploit pipelining and multiprocessors
- Understand the importance and tradeoffs of different types of memories.

- Identify pipeline hazards and possible solutions to those hazards

**TEXT BOOKS:**

1. Carl Hamacher, Zvonko Vranesic, Safwat Zaky, “Computer Organization”, 5<sup>th</sup> Edition, McGraw Hill Education, 2013.

**REFERENCE BOOKS:**

1. M.Morris Mano, “Computer System Architecture”, 3<sup>rd</sup> Edition, Pearson Education.
2. Themes and Variations, Alan Clements, “Computer Organization and Architecture”, CENGAGE Learning.
3. Smruti Ranjan Sarangi, “Computer Organization and Architecture”, McGraw Hill Education.
4. John P.Hayes, “Computer Architecture and Organization”, McGraw Hill Education

(Common to CSE & IT)

**Course Objectives:**

- To demonstrate the importance of algorithms in computing.
- To explain the analysis of algorithms
- To illustrate the method of finding the complexity of algorithms
- To explain the advanced algorithm design and analysis techniques.
- To introduce special classes of algorithms NP – completeness and the classes P and NP.

**UNIT I**

Introduction: Algorithm, Algorithm specification, Performance analysis.

Divide and Conquer: General method, Binary Search, Finding the maximum and minimum, Merge sort, Quick Sort, Selection, Strassen's matrix multiplication.

At the end of the unit, students will be able to:

- Understand growth functions and Asymptotic notations
- Derive the recurrence equation for running time of a given algorithm and solve.
- Understand the general principle of Divide and Conquer and identify suitable problems to apply Divide and Conquer paradigm
- Analyze the time complexities of Binary Search, Finding the maximum and minimum, and Strassen's matrix multiplication algorithms.
- Compare complexities of Merge sort, Quick sort and Selection sort techniques

**UNIT II**

Greedy Method: General method, Knapsack problem, Job Scheduling with Deadlines, Minimum cost Spanning Trees, Optimal storage on tapes, Single-source shortest paths.

Dynamic programming: General Method, Multistage graphs, All-pairs shortest paths, Optimal binary search trees, 0/1 knapsack, the traveling salesperson problem.

At the end of the unit, students will be able to:

- Understand optimization problems and the general principles of Greedy and Dynamic Programming paradigms to solve them.
- Apply subset and ordering paradigms of greedy strategy for Knapsack problem, Job Scheduling with Deadlines, Minimum cost Spanning Trees, Optimal storage on tapes, and finding Single-source shortest paths.

- Define Principle of optimality with examples.
- Differentiate Greedy and Dynamic programming paradigms.
- Apply dynamic programming strategy for Optimal binary search trees, Multistage graphs, All-pairs shortest paths, 0/1 knapsack, the traveling salesperson problem.

### **UNIT III**

Basic Traversal and Search Techniques: Techniques for binary trees, Techniques for Graphs, Connected components and Spanning trees, Bi-connected components and DFS

Back tracking: General Method, 8 – queens problem, Sum of subsets problem, Graph coloring and Hamiltonian cycles, Knapsack Problem.

At the end of the unit, students will be able to:

- Define solution space tree.
- Illustrate graph search strategies : BFS, DFS and D-Search .
- Determine articulation points and bi-connected components in a given graph using Depth First Spanning Trees.
- Demonstrate the recursive and iterative backtracking algorithms.
- Apply backtracking strategy to solve N – queens problem, Sum of subsets problem and Knapsack problem.
- Apply backtracking to solve m-colorability optimization problem.
- Determine all possible Hamiltonian Cycles in a graph using backtracking algorithm.

### **UNIT IV**

Branch and Bound: The method, Travelling salesperson, 0/1 Knapsack problem, Efficiency considerations.

Lower Bound Theory: Comparison trees, Lower bounds through reductions – Multiplying triangular matrices, inverting a lower triangular matrix, computing the transitive closure.

At the end of the unit, students will be able to:

- Illustrate the state space search techniques; FIFO, LIFO and LC.
- Analyze the advantage of bounding functions in Branch and Bound technique to solve the Travelling Salesperson problem.
- Compare the LC and FIFO branch and bound solutions for 0/1 knapsack problem.
- Understand lower bound theory concept in solving algebraic problems.

### **UNIT V**

NP – Hard and NP – Complete Problems: NP Hardness, NP Completeness, Consequences of being in P, Cook’s Theorem, Reduction Source Problems, Reductions: Reductions for some known problems

At the end of the unit, students will be able to:

- Differentiate deterministic and Non-deterministic algorithms.

- Define P, NP, NP –hard and NP-complete classes of problems.
- Understand the satisfiability problem.
- State Cook’s Theorem.
- Understand the reduction techniques.

### **Course Outcomes**

- Determine the time complexity of an algorithm by solving the corresponding recurrence equation
- Apply the Divide and Conquer strategy to solve searching, sorting and matrix multiplication problems.
- Analyze the efficiency of Greedy and Dynamic Programming design techniques to solve the optimization problems.
- Apply Backtracking technique for solving constraint satisfaction problems.
- Analyze the LC and FIFO branch and bound solutions for optimization problems, and compare the time complexities with Dynamic Programming techniques.
- Define and Classify deterministic and Non-deterministic algorithms; P, NP, NP –hard and NP-complete classes of problems.

### **Text Books**

1. Ellis Horowitz, SartajSahni and Rajasekaran, “Fundamentals of Computer Algorithms”, 2<sup>nd</sup> Edition, 2012, University Press.
2. ParagHimanshu Dave and HimanshuBhalchandra Dave, “Design and Analysis of Algorithms”, Second Edition, Pearson Education.

### **References**

1. Anany Levitin, “Introduction to the Design and Analysis of Algorithms”, Third Edition, Pearson Education, 2012.
2. Thomas H.Cormen, Charles E.Leiserson, Ronald L. Rivest and Clifford Stein, “Introduction to Algorithms”, Third Edition, PHI Learning Private Limited, 2012.
3. Alfred V. Aho, John E. Hopcroft and Jeffrey D. Ullman, “Data Structures and Algorithms”, Pearson Education, Reprint 2006.
4. Donald E. Knuth, “The Art of Computer Programming”, Volumes 1& 3 Pearson Education, 2009. Steven S. Skiena, “The Algorithm Design Manual”, Second Edition, Springer, 2008.



(19A52401) ENTREPRENEURSHIP

**Course Objectives:**

- To inculcate the Entrepreneurial qualities in students
- To train the students for Entrepreneurship
- To introduce the business model and business plan
- To learn about the methods of attracting investment in start-ups

**Unit-I: Entrepreneurship: Evolution and Revolution:** Entrepreneurs facing the unknown, Are you a business or social entrepreneur, Entrepreneurs have a particular mind-set, The evolution of the Under-taking, Entrepreneurship through the ages, Early definitions of Entrepreneurship, Approaches to Entrepreneurship, The entrepreneurial revolution: a global phenomenon.

**The Entrepreneurial Mind-Set-Cognition and Career:** The entrepreneurial mind, behaviour and career, Who are entrepreneurs, The dark side of entrepreneurship, The entrepreneur's confrontation with risk, Stress and the entrepreneur, The entrepreneurial ego, Pathways to your entrepreneurial career.

**Entrepreneurship and Sustainable Development:** Entrepreneurship as if the planet mattered, Entrepreneurship in times of crisis, Climate change effects for entrepreneurs, Climate change economics for entrepreneurs, entrepreneurial ecology.

**Unit- II: Social and Ethical Entrepreneurship: Entrepreneurial Edge:** Social Entrepreneurship, The mind-set of social entrepreneurs, Ecopreneurs, Ethics and Entrepreneurs, Defining entrepreneurial ethics, Ethics in the cross-cultural business world, Entrepreneurship and organized crime, Environmental criminal entrepreneurs, Entrepreneurship and disadvantaged groups, Indigenous entrepreneurs.

**Pathways to Entrepreneurial Ventures:** Walking entrepreneurship pathways, Bootstrapping, The classical pathway: Disruptive new venture creation, Acquiring an established entrepreneurial venture, Franchising one's way into entrepreneurship, Social venturing as a pathway to entrepreneurship.

**Unit- III : Opportunity and The Creative Pursuit of Innovative Ideas:** Ideas and the search for opportunity, four models of market-based opportunities, Entrepreneurial imagination and creativity, Arenas of creativity, Creating the right setting for creativity, Innovation and the entrepreneur, The innovation process, Innovation in the era of climate change.

**Developing Entrepreneurship within Organisations:** The entrepreneurial mind-set in organisations, Re-engineering organisational thinking, Not for business only: public sector entrepreneurship, Entrepreneurial strategy, social entrepreneurship by creating shared value,

**Unit –IV: The Assessment Of Entrepreneurial Opportunities:** The elements of an opportunity assessment, How do we model the entrepreneurial process, How to assess an opportunity, When is an idea not an opportunity, The evaluation process, The emergence of entrepreneurial ecosystems.

**Marketing For Entrepreneurial Ventures:** Entrepreneurial marketing is essential, Entrepreneurial marketing defined, The components of effective marketing, Developing a marketing plan, Marketing research, Marketing on the Internet, Green entrepreneurial marketing, Pricing strategies.

**Unit –V: Legal And Regulatory Challenges For Entrepreneurial Ventures:** Legal and regulatory challenges, Understanding Asia-Pacific regulatory environments, International protections for intellectual property, Patents, Copyrights, Trademarks, Domain names, Trade secrets, Opportunities from changing intellectual, Property attitudes, Identifying legal structures for entrepreneurial ventures, Incorporated companies, Unincorporated businesses, Other business forms, Insolvency and Bankruptcy, The legal framework regulating climate change.

**Sources of Capital For Entrepreneurial Ventures:** The times they are a-changin, What are the forms of entrepreneurial capital, Sources of financial capital, Debt Vs Equity, Equity financing The venture capital market, Angel financing, New forms of Entrepreneurial capital, Peer-to-peer lending,

**Course Outcomes:**

Students should be able to

- Design business model and business plan
- Demonstrate the Venture in front of investors
- Build the team for a start-up
- Illustrate successful cases of start-ups
- Develop strategies for market survey.

**Textbook:**

1. Howard Fredrick, Allan O Conner, and Donald F.Kuratko, “Entrepreneurship Theory/ Process/Practices” 4<sup>th</sup> Edition, Cengage Learning, 2016.

**References:**

1. Bill Aulet, “Disciplined Entrepreneurship Workbook” Willey Publishers
2. William Bygrave, A.Zacharakis, “ Entrepreneurship” 2<sup>nd</sup> Edition, Willey Publishers
3. Alexander Osterwalder, and Yves Pigneur – Business Model Generation – Wiley, 2011

**(19A05403T) OPERATING SYSTEMS**

**(Common to CSE& IT)**

**Course Objectives:**

The course is designed to

- Understand basic concepts and functions of operating systems
- Understand the processes, threads and scheduling algorithms.
- Provide good insight on various memory management techniques
- Expose the students with different techniques of handling deadlocks
- Explore the concept of file-system and its implementation issues
- Familiarize with the basics of Linux operating system
- Implement various schemes for achieving system protection and security

**UNIT I**

Operating Systems Overview: Introduction, Operating system functions, Operating systems operations, Computing environments, Open-Source Operating Systems

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

**Unit Outcomes:**

- Identify major components of operating systems
- Understand the types of computing environments
- Explore several open source operating systems
- Recognize operating system services to users, processes and other systems

**UNIT II**

Process Concept: Process scheduling, Operations on processes, Inter-process communication, Communication in client server systems.

Multithreaded Programming: Multithreading models, Thread libraries, Threading issues, Examples.

Process Scheduling: Basic concepts, Scheduling criteria, Scheduling algorithms, Multiple processor scheduling, Thread scheduling, Examples.

Inter-process Communication: Race conditions, Critical Regions, Mutual exclusion with busy waiting, Sleep and wakeup, Semaphores, Mutexes, Monitors, Message passing, Barriers, Classical IPC Problems - Dining philosophers problem, Readers and writers problem.

**Unit Outcomes:**

- Understand the importance, features of a process and methods of communication between processes.
- Improving CPU utilization through multi programming and multithreaded programming
- Examine several classical synchronization problems

### **UNIT III**

Memory-Management Strategies: Introduction, Swapping, Contiguous memory allocation, Paging, Segmentation, Examples.

Virtual Memory Management: Introduction, Demand paging, Copy on-write, Page replacement, Frame allocation, Thrashing, Memory-mapped files, Kernel memory allocation, Examples.

#### **Unit Outcomes:**

- Examine the various techniques of allocating memory to processes
- Summarize how paging works in contemporary computer systems
- Understanding the benefits of virtual memory systems.

### **UNIT IV**

Deadlocks: Resources, Conditions for resource deadlocks, Ostrich algorithm, Deadlock detection

And recovery, Deadlock avoidance, Deadlock prevention.

File Systems: Files, Directories, File system implementation, management and optimization.

Secondary-Storage Structure: Overview of disk structure, and attachment, Disk scheduling, RAID structure, Stable storage implementation.

#### **Unit Outcomes:**

- Investigate methods for preventing/avoiding deadlocks
- Examine file systems and its interface in various operating systems
- Analyze different disk scheduling algorithms

### **UNIT V**

System Protection: Goals of protection, Principles and domain of protection, Access matrix, Access control, Revocation of access rights.

System Security: Introduction, Program threats, System and network threats, Cryptography as a security, User authentication, implementing security defenses, firewalling to protect systems and networks, Computer security classification.

Case Studies: Linux, Microsoft Windows.

#### **Unit Outcomes:**

- Infer various schemes available for achieving system protection.

- Acquiring knowledge about various countermeasures to security attacks
- Outline protection and security in Linux and Microsoft Windows.

### **Unit Outcomes**

By the end of this course students will be able to:

- Realize how applications interact with the operating system
- Analyze the functioning of a kernel in an Operating system.
- Summarize resource management in operating systems
- Analyze various scheduling algorithms
- Examine concurrency mechanism in Operating Systems
- Apply memory management techniques in design of operating systems
- Understand the functionality of file system
- Compare and contrast memory management techniques.
- Understand the deadlock prevention and avoidance.
- Perform administrative tasks on Linux based systems.

### **Text Books:**

1. Silberschatz A, Galvin P B, and Gagne G, Operating System Concepts, 9th edition, Wiley, 2016.
2. Tanenbaum A S, Modern Operating Systems, 3rd edition, Pearson Education, 2008.  
(Topics: Inter-process Communication and File systems.)

### **Reference Books:**

1. Tanenbaum A S, Woodhull A S, Operating Systems Design and Implementation, 3rd edition, PHI, 2006.
2. Dhamdhare D M, Operating Systems A Concept Based Approach, 3rd edition, Tata McGraw-Hill, 2012.
3. Stallings W, Operating Systems -Internals and Design Principles, 6th edition, Pearson Education, 2009
4. Nutt G, Operating Systems, 3rd edition, Pearson Education, 2004

**(19A05404T) SOFTWARE ENGINEERING**

**(Common to CSE & IT)**

**Course Objectives:**

- To learn the basic concepts of software engineering and life cycle models
- To explore the issues in software requirements specification and enable to write SRS documents for software development problems
- To elucidate the basic concepts of software design and enable to carry out procedural and object oriented design of software development problems
- To understand the basic concepts of black box and white box software testing and enable to design test cases for unit, integration, and system testing
- To reveal the basic concepts in software project management

**Unit – I: Basic concepts in software engineering and software project management**

Basic concepts: abstraction versus decomposition, evolution of software engineering techniques, Software development life cycle (SDLC) models: Iterative waterfall model, Prototype model, Evolutionary model, Spiral model, RAD model, Agile models, software project management: project planning, project estimation, COCOMO, Halstead's Software Science, project scheduling, staffing, Organization and team structure, risk management, configuration management.

**Unit Outcomes:**

Student should be able to

1. Recognize the basic issues in commercial software development.
2. Summarize software lifecycle models.
3. Infer Workout project cost estimates using COCOMO and schedules using PERT and GANTT charts.

**Unit – II: Requirements analysis and specification**

The nature of software, The Unique nature of Webapps, Software Myths, Requirements gathering and analysis, software requirements specification, Traceability, Characteristics of a Good SRS Document, IEEE 830 guidelines, representing complex requirements using decision tables and decision trees, overview of formal system development techniques. axiomatic specification, algebraic specification.

**Unit Outcomes:**

Student should be able to

1. Identify basic issues in software requirements analysis and specification.
2. Develop SRS document for sample problems using IEEE 830 format.

3. Develop algebraic and axiomatic specifications for simple problems.

### **Unit – III : Software Design**

Good Software Design, Cohesion and coupling, Control Hierarchy: Layering, Control Abstraction, Depth and width, Fan-out, Fan-in, Software design approaches, object oriented vs. function oriented design. Overview of SA/SD methodology, structured analysis, Data flow diagram, Extending DFD technique to real life systems, Basic Object oriented concepts, UML Diagrams, Structured design, Detailed design, Design review, Characteristics of a good user interface, User Guidance and Online Help, Mode-based Vs Mode-less Interface, Types of user interfaces, Component-based GUI development, User interface design methodology: GUI design methodology.

#### **Unit Outcomes**

##### **Student should be able to**

1. Identify the basic issues in software design.
2. Apply the structured, object oriented analysis and design (SA/SD) technique.
3. Recognize the basic issues in user interface design.

### **Unit – IV : Coding and Testing**

Coding standards and guidelines, code review, software documentation, Testing, Black Box Testing, White Box Testing, debugging, integration testing, Program Analysis Tools, system testing, performance testing, regression testing, Testing Object Oriented Programs.

#### **Unit Outcomes:**

##### **Student should be able to**

1. Identify the basic issues in coding practice.
2. Recognize the basic issues in software testing.
3. Design test cases for black box and white box testing.

### **Unit – V: Software quality, reliability, and other issues**

Software reliability, Statistical testing, Software quality and management, ISO 9000, SEI capability maturity model (CMM), Personal software process (PSP), Six sigma, Software quality metrics, CASE and its scope, CASE environment, CASE support in software life cycle, Characteristics of software maintenance, Software reverse engineering, Software maintenance processes model, Estimation maintenance cost. Basic issues in any reuse program, Reuse approach, Reuse at organization level.

#### **Unit Outcomes:**

##### **Student should be able to**

1. Summarize various methods of software quality management.

2. Instruct the quality management standards ISO 9001, SEI CMM, PSP, and Six Sigma.
3. Outline software quality assurance, quality measures, and quality control.
4. Identify the basic issues in software maintenance, CASE support, and software reuse.

**Course Outcomes:**

Student should be able to

- Obtain basic software life cycle activity skills.
- Design software requirements specification for given problems.
- Implement structure, object oriented analysis and design for given problems.
- Design test cases for given problems.
- Apply quality management concepts at the application level.

**Text Book:**

1. Rajib Mall, “Fundamentals of Software Engineering”, 5th Edition, PHI, 2018.
2. Pressman R, “Software Engineering- Practioner Approach”, McGraw Hill.

**Reference Books:**

1. Somerville, “Software Engineering”, Pearson 2.
2. Richard Fairley, “Software Engineering Concepts”, Tata McGraw Hill.
3. Jalote Pankaj, “An integrated approach to Software Engineering”, Narosa



**Course Objectives:**

- To familiarize students with the architecture of OS.
- To provide necessary skills for developing and debugging CPU Scheduling algorithms.
- To elucidate the process management and scheduling and memory management.
- To explain the working of an OS as a resource manager, file system manager, process manager, memory manager, and page replacement tool.
- To provide insights into system calls, file systems and deadlock handling.

**List of Experiments**

1. Practicing of Basic UNIX Commands.
2. Write programs using following UNIX operating system calls  
Fork, exec, getpid, exit, wait, close, stst, opendir and readdir
3. Simulate UNIX commands like cp, ls, grep, etc.,
4. Simulate the following CPU scheduling algorithms  
a) Round Robin b) SJF c) FCFS d) Priority
5. Implement dynamic priority scheduling algorithm.
6. Assume that there are five jobs with different weights ranging from 1 to 5. Implement round robin algorithm with time slice equivalent to weight.
7. Implement priority scheduling algorithm. While executing, no process should wait for more than 10 seconds. If waiting time is more than 10 seconds, that process has to be executed for atleast 1 second before waiting again.
8. Control the number of ports opened by the operating system with  
a) Semaphore b) Monitors.
9. Simulate how parent and child processes use shared memory and address space.
10. Simulate sleeping barber problem.
11. Simulate dining philosopher's problem.
12. Simulate producer and consumer problem using threads.
13. Implement the following memory allocation methods for fixed partition  
a) First fit b) Worst fit c) Best fit
14. Simulate the following page replacement algorithms  
a) FIFO b) LRU c) LFU etc.,
15. Simulate Paging Technique of memory management
16. Simulate Bankers Algorithm for Dead Lock avoidance and prevention
17. Simulate following file allocation strategies  
a) Sequential b) Indexed c) Linked
18. Simulate all File Organization Techniques  
a) Single level directory b) Two level c) Hierarchical d) DAG

**Course Outcomes:**

- Trace different CPU Scheduling algorithm (L2).
- Implement Bankers Algorithms to Avoid and prevent the Dead Lock (L3).
- Evaluate Page replacement algorithms (L5).
- Illustrate the file organization techniques (L4).
- Illustrate shared memory process (L4).
- Design new scheduling algorithms (L6)

### **Reference Books:**

1. Abraham Silberchatz, Peter B. Galvin, Greg Gagne, “Operating System Concepts”, Eighth Edition, John Wiley.
2. “Operating Systems: Internals and Design Principles”, Stallings, Sixth Edition–2009, Pearson Education
3. Andrew S Tanenbaum “Modern Operating Systems”, Second Edition, PHI.
4. S. Haldar, A.A. Aravind, “Operating Systems”, Pearson Education.
5. B.L.Stuart, “Principles of Operating Systems”, Cengage learning, India Edition.2013-2014
6. A.S.Godbole “Operating Systems”, Second Edition, TMH.
7. P.C.P. Bhatt, “An Introduction to Operating Systems”, PHI.

(19A05404P) SOFTWARE ENGINEERING LAB

**Course Objectives:**

1. To Learn and implement the fundamental concepts of software Engineering.
2. To explore functional and non functional requirements through SRS.
3. To practice the various design diagrams through appropriate tool.
4. To learn to implement various software testing strategies.

**List of Experiments:**

- 1 Draw the Work Breakdown Structure for the system to be automated
- 2 Schedule all the activities and sub-activities Using the PERT/CPM charts
- 3 Define use cases and represent them in use-case document for all the stakeholders of the system to be automated
- 4 Identify and analyze all the possible risks and its risk mitigation plan for the system to be automated
- 5 Diagnose any risk using Ishikawa Diagram (Can be called as Fish Bone Diagram or Cause & Effect Diagram)
- 6 Define Complete Project plan for the system to be automated using Microsoft Project Tool
- 7 Define the Features, Vision, Bussiness objectives, Bussiness rules and stakeholders in the vision document
- 8 Define the functional and non-functional requirements of the system to be automated by using Usecases and document in SRS document
- 9 Define the following traceability matrices :
  1. Usecase Vs. Features
  2. Functional requirements Vs.Usecases
- 10 Estimate the effort using the following methods for the system to be automated:
  1. Function point metric
  2. Usecase point metric
- 11 Develop a tool which can be used for quantification of all the non-functional requirements
- 12 Write C/C++/Java/Python program for classifying the various types of coupling.
- 13 Write a C/C++/Java/Python program for classifying the various types of cohesion.
- 14 Write a C/C++/Java/Python program for object oriented metrics for design proposed Chidamber and kremer . (Popularly called as CK metrics)
- 15 Convert the DFD into appropriate architecture styles.
- 16 Draw complete class diagram and object diagrams using Rational tools
- 17 Define the design activities along with necessary artifacts using Design Document.
- 18 Reverse Engineer any object-oriented code to an appropriate class and object diagrams.
- 19 Test a piece of code which executes a specific functionality in the code to be tested and asserts a certain behavior or state using Junit.

- 20 Test the percentage of code to be tested by unit test using any code coverage tools
- 21 Define an appropriate metrics for at least 3 quality attributes for any software application of your interest.
- 22 Define a complete call graph for any C/C++ code. (Note: The student may use any tool that generate call graph for source code)

### **Unit Outcomes**

#### **Student is able to**

- Acquaint with historical and modern software methodologies
- Understand the phases of software projects and practice the activities of each phase
- Practice clean coding
- Take part in project management
- Adopt skills such as distributed version control, unit testing, integration testing, build management, and deployment

(19A99302) BIOLOGY FOR ENGINEERS

**Course Objectives:** To provide basic understanding about life and life Process. Animal and plant systems. To understand what biomolecules are, their structures and functions. Application of certain biomolecules in Industry.

- Brief introduction about human physiology and bioengineering.
- To understand hereditary units, i.e. DNA (genes) and RNA and their synthesis in living organism.
- How biology Principles can be applied in our daily life using different technologies.
- Brief introduction to the production of transgenic microbes, Plants and animals.

**Unit I: Introduction to Basic Biology**

Cell as Basic unit of life, cell theory, Cell shapes, Cell structure, Cell cycle. Chromosomes. Prokaryotic and eukaryotic Cell. Plant Cell, Animal Cell, Plant tissues and Animal tissues, Brief introduction to five kingdoms of classification.

**Unit Outcomes:**

After completing this unit, the student will be able to

- Summarize the basis of life. (L1)
- Understand the difference between lower organisms (prokaryotes) from higher organisms (eukaryotes). (L2)
- Understand how organisms are classified. (L3)

**Unit II: Introduction to Biomolecules**

Carbohydrates, lipids, proteins, Vitamins and minerals, Nucleic acids (DNA and RNA) and their types. Enzymes, Enzyme application in Industry. Large scale production of enzymes by Fermentation.

**Unit Outcomes:**

After completing this unit, the student will be able to

- Understand what are biomolecules? their role in living cells, their structure, function and how they are produced. (L1)
- Interpret the relationship between the structure and function of nucleic acids. (L2)
- Summarize the applications of enzymes in industry. (L3)
- Understand what is fermentation and its applications of fermentation in industry. (L4)

**Unit III: Human Physiology**

Nutrition: Nutrients or food substances. Digestive system, Respiratory system, (aerobic and anaerobic Respiration). Respiratory organs, respiratory cycle. Excretory system.

**Unit Outcomes:**

After completing this unit, the student will be able to

- Understand what nutrients are (L1)
- Understand the mechanism and process of important human functions (L2 & L3)

**Unit IV: Introduction to Molecular Biology and recombinant DNA Technology**

Prokaryotic gene and Eukaryotic gene structure. DNA replication, Transcription and Translation. rDNA technology. Introduction to gene cloning.

**Unit Outcomes:**

After completing this unit, the student will be able to

- Understand and explain about gene structure and replication in prokaryotes and Eukaryotes (L1)
- How genetic material is replicated and also understands how RNA and proteins are synthesized. (L2)
- Understand about recombinant DNA technology and its application in different fields.(L3)
- Explain what is cloning. (L4)

**Unit V: Application of Biology**

Brief introduction to industrial Production of Enzymes, Pharmaceutical and therapeutic Proteins, Vaccines and antibodies. Basics of biosensors, biochips, Bio fuels, and Bio Engineering. Basics of Production of Transgenic plants and animals.

**Unit Outcomes:**

After completing this unit, the student will be able to Understand.

- How biology is applied for production of useful products for mankind.(L1)
- What are biosensors, biochips etc. (L2)
- Understand transgenic plants and animals and their production (L3)

**Course Outcomes:**

After studying the course, the student will be able to:

- Explain about cells and their structure and function. Different types of cells and basics for classification of living Organisms.
- Explain about biomolecules, their structure and function and their role in the living organisms. How biomolecules are useful in Industry.

- Briefly about human physiology.
- Explain about genetic material, DNA, genes and RNA how they replicate, pass and preserve vital information in living Organisms.
- Know about application of biological Principles in different technologies for the production of medicines and Pharmaceutical molecules through transgenic microbes, plants and animals.

**Text books:**

1. P.K.Gupta, Cell and Molecular Biology, 5<sup>th</sup> Edition, Rastogi Publications -
2. U. Satyanarayana. Biotechnology, Books & Allied Ltd 2017

**Reference Books:**

1. N. A. Campbell, J. B. Reece, L. Urry, M. L. Cain and S. A. Wasserman, “Biology: A Global Approach”, Pearson Education Ltd, 2018.
2. T Johnson, Biology for Engineers, CRC press, 2011
3. J.M. Walker and E.B. Gingold, Molecular Biology and Biotechnology 2<sup>nd</sup> ed.. Panima Publications. PP 434.
4. David Hames, Instant Notes in Biochemistry –2016
5. Phil Tunner, A. Mctennan, A. Bates & M. White, Instant Notes – Molecular Biology – 2014

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR**  
**B.Tech (CSE)– III-I Sem** **L T P C**  
**3 0 0 3**  
**(19A05501) FORMAL LANGUAGES AND AUTOMATA THEORY**  
**(Common to CSE & IT)**

**Course Objectives:**

This course is designed to:

- Introduce languages, grammars, and computational models
- Explain the Context Free Grammars
- Enable the students to use Turing machines
- Demonstrate decidability and un-decidability for NP Hard problems

**UNIT – I: Finite Automata**

Why Study Automata Theory? The Central Concepts of Automata Theory, Automation, Finite Automata, Transition Systems, Acceptance of a String by a Finite Automata, DFA, Design of DFAs, NFA, Design of NFA, Equivalence of DFA and NFA, Conversion of NFA into DFA, Finite Automata with E-Transition, Minimization of Finite Automata, Mealy and Moore Machines, Applications and Limitation of Finite Automata.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Distinguish DFA and NFA. (L4)
- Construct DFA for an input string. (L6)
- Perform minimization of Automata.(L5)
- Compare Moore and Mealy Machines.(L2)

**UNIT – II: Regular Expressions**

Regular Expressions, Regular Sets, Identity Rules, Equivalence of two Regular Expressions, Manipulations of Regular Expressions, Finite Automata, and Regular Expressions, Inter Conversion, Equivalence between Finite Automata and Regular Expressions, Pumping Lemma, Closers Properties, Applications of Regular Expressions, Finite Automata and Regular Grammars, Regular Expressions and Regular Grammars.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Construct regular expression for the given Finite Automata.(L6)
- Construct finite automata for the given regular expression.(L6)
- Apply closure properties on regular expressions.(L3)

**UNIT – III: Context Free Grammars**



Formal Languages, Grammars, Classification of Grammars, Chomsky Hierarchy Theorem, Context Free Grammar, Leftmost and Rightmost Derivations, Parse Trees, Ambiguous Grammars, Simplification of Context Free Grammars-Elimination of Useless Symbols, E-Productions and Unit Productions, Normal Forms for Context Free Grammars-Chomsky Normal Form and Greibach Normal Form, Pumping Lemma, Closure Properties, Applications of Context Free Grammars.

### **Learning Outcomes:**

At the end of this unit, the student will be able to

- Define Context Free Grammar. (L1)
- Distinguish Chomsky Normal Form and Greibach Normal form.(L4)
- Apply Pumping Lemma theorem on Context Free Grammar.(L3)

### **UNIT – IV: Pushdown Automata**

Pushdown Automata, Definition, Model, Graphical Notation, Instantaneous Description Language Acceptance of pushdown Automata, Design of Pushdown Automata, Deterministic and Non – Deterministic Pushdown Automata, Equivalence of Pushdown Automata and Context Free Grammars Conversion, Two Stack Pushdown Automata, Application of Pushdown Automata.

### **Learning Outcomes:**

At the end of this unit, the student will be able to

- List the applications of Pushdown Automata. (L1)
- Construct Pushdown Automata for context free grammar.(L6)

### **UNIT – V: Turing Machine**

Turing Machine, Definition, Model, Representation of Turing Machines-Instantaneous Descriptions, Transition Tables and Transition Diagrams, Language of a Turing Machine, Design of Turing Machines, Techniques for Turing Machine Construction, Types of Turing Machines, Church's Thesis, Universal Turing Machine, Restricted Turing Machine.

**Decidable and Undecidable Problems:** NP, NP-Hard and NP-Complete Problems.

### **Learning Outcomes:**

At the end of this unit, the student will be able to

- List types of Turing Machines.(L1)
- Design Turing Machine.(L6)
- Formulate decidability and undecidability problems. (L6)

### **Course Outcomes:**

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

- Explain formal machines, languages and computations (L2)
- Design finite state machines for acceptance of strings (L6)
- Develop context free grammars for formal languages (L3)

- Build pushdown automata for context free grammars (L3)
- Apply Turing machine for solving problems (L3)
- Validate decidability and undecidability (L6)

**TEXT BOOKS:**

1. Introduction to Automata Theory, Languages and Computation, J.E.Hopcroft, R.Motwani and J.D.Ullman, 3<sup>rd</sup> Edition, Pearson, 2008.
2. Theory of Computer Science-Automata, Languages and Computation, K.L.P.Mishra and N.Chandrasekaran, 3<sup>rd</sup> Edition, PHI, 2007.

**REFERENCE BOOKS:**

1. Formal Language and Automata Theory, K.V.N.Sunitha and N.Kalyani, Pearson, 2015.
2. Introduction to Automata Theory, Formal Languages and Computation, Shyamalendu Kandar, Pearson, 2013.
3. Theory of Computation, V.Kulkarni, Oxford University Press, 2013.
4. Theory of Automata, Languages and Computation, Rajendra Kumar, McGraw Hill, 2014.

**(19A05502T) ARTIFICIAL INTELLIGENCE**  
**(Common to CSE & IT)**

**Course Objectives:**

This course is designed to:

- 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 the unit, students will be able to:

- Recognize the importance of Artificial Intelligence (L1)
- Identify how intelligent agent is related to its environment (L2)
- Build an Intelligent agent (L3)

**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 Continuous Spaces, Searching with Nondeterministic Actions, Searching with partial observations, online search agents and unknown environments.

**Learning Outcomes:**

At the end of the unit, students 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)
- Derive new representations about the world using process of inference (L5)

**Unit – III: Reinforcement Learning:** Introduction, Passive Reinforcement Learning, Active Reinforcement Learning, Generalization in Reinforcement Learning, Policy Search, applications of RL

**Natural Language Processing:** Language Models, Text Classification, Information Retrieval, Information Extraction.

**Learning Outcomes:**

At the end of the unit, students 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 the unit, students 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 the unit, students will be able to:

- Explain the role of Robot in various applications. (L2)
- List the main philosophical issues in AI. (L1)

**Course outcomes:**

Upon completion of the course, the students should 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)

**Textbook:**

1. Stuart J.Russell, Peter Norvig, “Artificial Intelligence A Modern Approach”, 3<sup>rd</sup> Edition, Pearson Education, 2019.

**References:**

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.

**(19A05503T) OBJECT-ORIENTED ANALYSIS DESIGN AND TESTING**  
**(Common to CSE & IT)**

**Course Objectives:**

This course is designed to:

- Understand the basic concepts of object-oriented techniques
- Build the Model of the software system using UML diagrams
- Elucidate design patterns as templates for good design
- Learn the object-oriented methodology in software design
- Explore testing techniques for object-oriented software

**Unit – 1: Basic concepts**

Basic concepts: objects, classes, abstract classes, data types, ADT, encapsulation and information hiding, inheritance, association, aggregation, composition, polymorphism, dynamic binding, object-oriented principles.

**Learning Outcomes:**

At the end of the unit, students will be able to:

- Recognize basic issues of object-orientation (L2)
- Identify class relations from problem statements (L4)
- Construct basic principles of object-orientation (L6)

**Unit – 2: Modelling Using UML**

UML Diagrams: Use case diagrams, class diagrams, various relationships among classes: generalization, association, aggregation, composition, inheritance, dependency etc., object diagram, UML packages, activity diagram, state machine diagram, sequence diagram, communication diagram, interaction overview diagram, component diagram, deployment diagram, UML 2 diagrams.

**Learning outcomes:**

At the end of the unit, students will be able to:

- Describe the basic syntax and semantics of UML (L2)
- Develop modeling of the user's view using use case diagrams (L3)
- Design class diagram and object-diagrams (L6)
- Summarize behavioral modeling of a given problem using sequence diagram, collaboration diagram, and state chart diagram (L2)

**Unit – 3: Design Patterns**

Basic pattern concepts, Types of patterns, some common design patterns such as Expert, Creator, Façade, MVS, MVC, Publish-Subscribe, Observer, Proxy etc.

### **Learning outcomes**

At the end of the unit, students will be able to:

- Identify the basic issues in reusable design (L4)
- Recognize the basic design patterns (L2)

### **Unit – 4: Designing using UML**

Overview of OOAD methodology, Use case model development, Domain modelling, Identification of entity objects, Brooch's object identification method, Interaction modelling, CRC cards, Applications of the analysis and design process, object-oriented design principles. OOD goodness criteria, CK Metrics, LK Metrics, MOOD Metrics, Code Refactoring

### **Learning outcomes:**

At the end of the unit, students will be able to:

- Interpret domain modeling (L2)
- Develop sequence diagram for any given use case (L3)
- Design class diagram for a given problem (L6)

### **Unit – 5 : Testing Object Oriented Software**

Challenges in testing object-oriented software, Implications of object-oriented Features in testing object-oriented software, Importance of grey-box testing of object-oriented software, Coverage analysis, State-based testing, Class testing, Fault-Based Testing, Scenario-Based Test Design, Integration Testing: Thread-based integration Strategies, Use-based integration Strategies, Cluster Testing, Validation Testing, System Testing, Testing tools.

### **Learning outcomes:**

At the end of the unit, students will be able to:

- Design unit test cases (L6)
- Design integration test cases (L6)
- Select appropriate tool to carry out testing (L2)

### **Course outcomes:**

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

- Analyze the problem from object oriented perspective (L4)

- Model complex systems using UML Diagrams (L3)
- Choose the suitable design patterns in software design (L5)
- Adapt Object-Oriented Design Principles (L6)
- Identify the challenges in testing object-oriented software. (L3)

**Text Book:**

1. Rajib Mall, “Fundamentals of Software Engineering”, 5th Edition, PHI, 2018

**Reference Books:**

1. Rumbaugh and Blaha, Object-oriented Modeling and design with UML, Pearson, 2007
2. Bernd Bruegge and, Allen H. Dutoit, Object-Oriented Software Engineering Using UML, Patterns, and Java, Pearson, 2009



**(19A05504T) COMPUTER NETWORKS**  
(Common to CSE & IT)

**Course Objectives:**

This course is designed to:

- Understand the basic concepts of Computer Networks.
- Introduce the layered approach for design of computer networks
- Familiarize with the applications of Internet
- Explore the network protocols used in Internet environment
- Explain the format of headers of IP, TCP and UDP
- Elucidate the design issues for a computer network

**Unit – 1: Computer Networks and the Internet**

What is the Internet?, The Network Edge, The Network Core, Delay, Loss, and Throughput in Packet-Switched Networks, Protocol Layers and their Service Models, Networks under attack, History of Computer Networking and the Internet

**Learning Outcomes:**

At the end of the unit, students will be able to:

- Enumerate the hardware components of a computer network (L1)
- List the layers of a Computer Network (L1)
- Identify the performance metrics of a computer network (L3)

**Unit – 2: Application Layer**

Principles of Network Applications, The web and HTTP, File transfer: FTP, Electronic mail in the internet, DNS-The Internet's Directory Service, Peer-to-Peer Applications

**Learning outcomes:**

At the end of the unit, students will be able to:

- Design new applications of a computer network (L6)
- Analyze the application protocols (L4)
- Extend the existing applications (L2)

**Unit – 3 : Transport Layer**

Introduction and Transport-Layer Services, Multiplexing and De-multiplexing, Connectionless Transport: UDP, Principles of Reliable Data transfer, Connection-Oriented Transport: TCP, Principles of Congestion Control, TCP Congestion Control

**Learning outcomes:**

At the end of the unit, students will be able to:

- Design Congestion control algorithms (L6)

- Select the appropriate transport protocol for an application (L3)
- Identify the transport layer services (L3)

#### **Unit – 4 :The Network Layer**

Introduction, Virtual Circuit and Datagram Networks, The Internet Protocol(IP): Forwarding and Addressing in the Internet, Routing Algorithms, Routing in the Internet, Broadcast and Multicast Routing

##### **Learning outcomes:**

At the end of the unit, students will be able to:

- Compare routing algorithms (L4)
- Design routing algorithms (L6)
- Extend the existing routing protocols (L2)

#### **Unit – 5 :The Layer: Links, Access Networks, and LANs**

Introduction to the Link Layer, Error-Detection and Correction Techniques, Multiple Access Links and Protocols, Switched Local Area Networks, Link Virtualization: A Network as a Link Layer, Data Center Networking, Retrospective: A Day in the Life of a Web Page Request

##### **Learning outcomes:**

At the end of the unit, students will be able to:

- Compare medium access protocols (L4)
- Classify the computer networks (L2)
- Design a Data Centre for an organization (L6)

##### **Course Outcomes:**

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

1. Identify the software and hardware components of a Computer network (L3)
2. Develop new routing, and congestion control algorithms (L3)
3. Assess critically the existing routing protocols (L5)
4. Explain the functionality of each layer of a computer network (L2)
5. Choose the appropriate transport protocol based on the application requirements (L3)

##### **Text Books:**

1. James F. Kurose, Keith W. Ross, “Computer Networking: A Top-Down Approach”, 6<sup>th</sup> edition, Pearson, 2019.

##### **References:**

1. Forouzan, “Datacommunications and Networking”, 5<sup>th</sup> Edition, McGraw Hill Publication.

2. Andrew S.Tanenbaum, David j.wetherall, “Computer Networks”, 5<sup>th</sup> Edition, PEARSON.
3. Youlu Zheng, Shakil Akthar, “Networks for Computer Scientists and Engineers”, Oxford Publishers, 2016.

**(19A05505a) DATA WAREHOUSING AND DATA MINING**

**(Common to CSE & IT)**

**COURSE OBJECTIVES:**

This course is designed to:

- Familiarize with mathematical foundations of data mining tools.
- Introduce classical models and algorithms in data warehouses and data mining.
- Investigate the kinds of patterns that can be discovered by association rule mining, classification and clustering.
- Explore data mining techniques in various applications like social, scientific and environmental context.

**UNIT I:**

Basic Concepts – Data Warehousing Components – Building a Data Warehouse – Database Architectures for Parallel Processing – Parallel DBMS Vendors – Multidimensional Data Model – Data Warehouse Schemas for Decision Support, Concept Hierarchies -Characteristics of OLAP Systems – Typical OLAP Operations, OLAP and OLTP.

**Learning Outcomes:**

At the end of the unit, students will be able to:

- Identify the component of Data warehouse (L1)
- Create the architecture of Data warehouse (L6)
- Apply different types of OLAP operations (L3)

**UNIT II:**

Introduction to Data Mining Systems – Knowledge Discovery Process – Data Mining Techniques – Issues – applications- Data Objects and attribute types, Statistical description of data, Data Preprocessing – Cleaning, Integration, Reduction, Transformation and discretization, Data Visualization, Data similarity and dissimilarity measures.

**Learning Outcomes:**

At the end of the unit, students will be able to:

- Summarize the data processing steps (L2)
- Apply data cleaning process (L3)

**UNIT III:**

Mining Frequent Patterns, Associations and Correlations – Mining Methods- Pattern Evaluation Method – Pattern Mining in Multilevel, Multi Dimensional Space – Constraint Based Frequent Pattern Mining, Classification using Frequent Patterns.

## **Learning Outcomes:**

At the end of the unit, students will be able to:

- Understand Association Rules(L2)
- Apply different Mining Methods (L3)
- Review Classification using Frequent Patterns (L2)

## **UNIT IV:**

Decision Tree Induction – Bayesian Classification – Rule Based Classification – Classification by Back Propagation – Support Vector Machines — Lazy Learners – Model Evaluation and Selection-Techniques to improve Classification Accuracy. Clustering Techniques – Cluster analysis-Partitioning Methods – Hierarchical Methods – Density Based Methods – Grid Based Methods – Evaluation of clustering – Clustering high dimensional data- Clustering with constraints, Outlier analysis-outlier detection methods.

## **Learning Outcomes:**

At the end of the unit, students will be able to:

- Creating Decision Tree (L6)
- Evaluate Classification techniques (L5)

## **UNIT V: WEKA TOOL**

Datasets – Introduction, Iris plants database, Breast cancer database, Auto imports database – Introduction to WEKA, The Explorer – Getting started, Exploring the explorer, Learning algorithms, Clustering algorithms, Association–rule learners.

## **Learning Outcomes:**

At the end of the unit, students will be able to:

- Investigate WEKA tool (L4)
- Explain learning, clustering algorithms (L2)

## **Course Outcomes:**

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

- Design a Data warehouse system and perform business analysis with OLAP tools (L6).
- Apply suitable pre-processing and visualization techniques for data analysis (L3)
- Apply frequent pattern and association rule mining techniques for data analysis (L3)
- Design appropriate classification and clustering techniques for data analysis (L6)
- Infer knowledge from raw data (L4)

**TEXT BOOK:**

1.Jiawei Han and Micheline Kamber, —Data Mining Concepts and Techniques, Third Edition, Elsevier, 2012.

**REFERENCES:**

1.Alex Berson and Stephen J.Smith, —Data Warehousing, Data Mining & OLAP, Tata McGraw – Hill Edition, 35th Reprint 2016.

2.K.P. Soman, Shyam Diwakar and V. Ajay, —Insight into Data Mining Theory and Practice, Eastern Economy Edition, Prentice Hall of India, 2006.

3.Ian H.Witten and Eibe Frank, —Data Mining: Practical Machine Learning Tools and Techniques, Elsevier, Second Edition.

**(19A05505b) WEB TECHNOLOGIES**  
**(Common to CSE & IT)**

**Course Objectives:**

This course is designed to:

- Familiarize the tags of HTML.
- Understand different Client side Scripting.
- Learn -specific web services of server side Programming.
- Connect different applications using PHP & XML .
- Connect XHTML, Java Scripting, Servlet Programming, Java Server Pages.

**UNIT I WEBSITE BASICS, HTML 5, CSS 3, WEB 2.0**

Web Essentials: Clients, Servers and Communication – The Internet – Basic Internet protocols – World wide web – HTTP Request Message – HTTP Response Message – Web Clients – Web Servers – HTML5 – Tables – Lists – Image – HTML5 control elements – Semantic elements – Drag and Drop – Audio – Video controls - CSS3 – Inline, embedded and external style sheets – Rule cascading – Inheritance – Backgrounds – Border Images – Colors – Shadows – Text – Transformations – Transitions – Animations.

**Learning Outcomes:**

At the end of the unit, students will be able to:

- Create standard tags of HTML tags and Knowing the features of designing static webpages. (L6)
- List different types of CSS to design webpage attractively. (L1)
- Utilize different tools like Adobe Dream weaver and Microsoft Frontpage.(L3)

**UNIT II CLIENT SIDE PROGRAMMING**

Java Script: An introduction to JavaScript–JavaScript DOM Model-Date and Objects,-Regular Expressions- Exception Handling-Validation-Built-in objects-Event Handling - DHTML with JavaScript- JSON introduction – Syntax – Function Files – Http Request – SQL.

**Learning Outcomes:**

At the end of the unit, students will be able to:

- Explain different types of client side scripting. ( L2)
- Construct dynamic webpages using DHTML.(L6)
- Illustrate validation for webpages.(L2)

**UNIT III SERVER SIDE PROGRAMMING**

Servlets: Java Servlet Architecture- Servlet Life Cycle- Form GET and POST actions-Session Handling- Understanding Cookies- Installing and Configuring Apache Tomcat Web Server-DATABASE CONNECTIVITY: JDBC perspectives, JDBC program example - JSP: Understanding Java Server Pages-JSP Standard Tag Library (JSTL)-Creating HTML forms by embedding JSP code.

### **Learning Outcomes:**

At the end of the unit, students will be able to:

- Analyze the importance of Server side scripting. (L4)
- Demonstrate deployment of the application using Tomcat Server.(L2)
- Experiment with Storing and Retrieving data from JDBC. (L3)

## **UNIT IV PHP and XML**

An introduction to PHP: PHP- Using PHP- Variables- Program control- Built-in functions-Form Validation- Regular Expressions - File handling – Cookies - Connecting to Database. XML: Basic XML- Document Type Definition- XML Schema DOM and Presenting XML, XML Parsers and Validation, XSL and XSLT Transformation, News Feed (RSS and ATOM).

### **Learning Outcomes:**

At the end of the unit, students will be able to:

- Understand how XML interacts with different applications. (L1)
- Develop PHP Programs using WAMP and XAMPP Server.(L3)
- Examine background applications using XSL and XSLT.(L4)

## **UNIT V INTRODUCTION TO AJAX and WEB SERVICES**

AJAX: Ajax Client Server Architecture-XML Http Request Object-Call Back Methods; Web Services: Introduction- Java web services Basics – Creating, Publishing, Testing and Describing a Web services (WSDL)-Consuming a web service, Database Driven web service from an application –SOAP.

### **Learning Outcomes:**

At the end of the unit, students will be able to:

- Explain the importance of AJAX Architecture.
- Integrate and test web services.

### **Course Outcomes:**

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

- Construct a basic website using HTML and Cascading Style Sheets.(L3)
- Build dynamic web page with validation using Java Script objects and by applying different event handling mechanisms.(L6)
- Develop server side programs using Servlets and JSP.(L3)
- Construct simple web pages in PHP and represent data in XML format. (L6)
- Utilize AJAX and web services to develop interactive web applications.(L3)



**Text Books:**

1. Deitel and Deitel and Nieto, —Internet and World Wide Web - How to Programl, Prentice Hall, 5th Edition, 2011.
2. Web Technologies, Uttam K. Roy, Oxford Higher Education., 1<sup>st</sup> edition, 10<sup>th</sup> impression, 2015.
3. The Complete Reference PHP by Steven Holzner, MGH HILL Education, Indian Edition, 2008.

**References**

1. Stephen Wynkoop and John Burke —Running a Perfect Website, QUE, 2<sup>nd</sup> Edition,1999.
2. Chris Bates, Web Programming – Building Intranet Applications, 3rd Edition, WileyPublications, 2009.
3. Jeffrey C and Jackson, —Web Technologies A Computer Science PerspectivePearson Education, 2011.
4. Gopalan N.P. and Akilandeswari J., —Web Technology, Prentice Hall of India, 2011.

**(19A05505C) MOBILE APPLICATION DEVELOPMENT**

**(Common to CSE & IT)**

**COURSE OBJECTIVES:**

This course is designed to:

- Facilitate students to understand android SDK
- Help students to gain a basic understanding of Android application development
- Inculcate working knowledge of Android Studio development tool

**UNIT-I:** Introduction to Android: The Android Platform, Android SDK, Eclipse Installation, Android Installation, Building your First Android application, Understanding Anatomy of Android Application, AndroidManifest file.

**Learning Outcomes:**

At the end of the unit, students will be able to:

- Make use of the Android platform (L3)
- Create and Run Android project using SDK (L6)
- Define the Anatomy of Android Application. (L1)

**UNIT-II:** Android Application Design Essentials: Anatomy of an Android applications, Android terminologies, Application Context, Activities, Services, Intents, Receiving and Broadcasting Intents, Android Manifest File and its common settings, Using Intent Filter, Permissions

**Learning Outcomes:**

At the end of the unit, students will be able to:

6. Explain the terminology used in Android applications (L2)
7. Develop first level Android applications that can accept information from the users (L3)
8. Illustrate the Android Manifest File and its common settings (L2)

**UNIT-III:** Android User Interface Design Essentials: User Interface Screen elements, Designing User Interfaces with Layouts, Drawing and Working with Animation.

**Learning Outcomes:**

At the end of the unit, students will be able to:

- Design Android application screen with various elements for improving users experience(L6)
- Develop Android application with animations (L6)

**UNIT-IV:** Testing Android applications, Publishing Android application, Using Android preferences, Managing Application resources in a hierarchy, working with different types of resources.

**Learning Outcomes:**

At the end of the unit, students will be able to:

- Demonstrate Testing and publishing of their developed Android applications in the internet. (L2)
- Explain how to manage Application resources in a hierarchy (L2)

**UNIT V:** Using Common Android APIs: Using Android Data and Storage APIs, Managing data using Sqlite,Sharing Data between Applications with Content Providers, Using Android Networking APIs, UsingAndroid Web APIs, Using Android Telephony APIs, Deploying Android Application to the World.

**Learning Outcomes:**

At the end of the unit, students will be able to:

- Develop top end applications that work with data storing and sharing facility.(L6)
- Interpret and Develop applications based on customer perspective(L5)
- Utilize various Android API's for improving users experience(L3)

**Course Outcomes**

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

- Identify various concepts of mobile programming that make it unique from programming forother platforms (L3)
- Evaluate mobile applications on their design pros and cons. (L5)
- Utilize rapid prototyping techniques to design and develop sophisticated mobile interfaces. (L3)
- Develop mobile applications for the Android operating system that use basic and advanced phone features. (L6)
- Demonstrate the deployment of applications to the Android marketplace for distribution. (L2)

**TEXT BOOKS:**

1. Lauren Darcey and Shane Conder, “Android Wireless Application Development”, Pearson Education, 2nd ed. (2011)

**REFERENCE BOOKS:**

1. Reto Meier, “Professional Android 2 Application Development”, Wiley India Pvt Ltd
2. Mark L Murphy, “Beginning Android”, Wiley India Pvt Ltd
3. Android Application Development All in one for Dummies by Barry Burd, Edition: I

**(19A01506a) EXPERIMENTAL STRESS ANALYSIS**  
**OPEN ELECTIVE-I**

**Course Objective:**

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 the unit, students 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 the unit, students 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 the unit, students 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 the unit, students 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 patterns- Isoclinic 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 the unit, students will be able to:

- Introduces the understanding of different fringe patterns.
- Introduces model analysis and properties of photo elastic materials.

#### **Course Outcomes:**

After completion of the course

- 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

#### **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.

**(19A01506b) BUILDING TECHNOLOGY**  
**OPEN ELECTIVE-I**

**Course Objectives:**

- To impart to know different types of buildings, principles and planning of the buildings.
- To identify the termite control measure in buildings, and importance of grouping circulation, lighting and ventilation aspects in buildings.
- To know the different modes of vertical transportation in buildings.
- To know the utilization of prefabricated structural elements in buildings.
- To know the importance of acoustics in planning and designing of buildings.

**UNIT-I**

Overview of the course, basic definitions, buildings-types-components- economy and design-principles of planning of buildings and their importance. Definitions and importance of grouping and circulation-lighting and ventilation-consideration of the above aspects during planning of building.

**Learning outcomes:**

At the end of the unit, students will be able to:

- To be able to plan the building with economy and according to functional requirement.

**UNIT-II**

Termite proofing: Inspection-control measures and precautions- lighting protection of buildings-general principles of design of openings-various types of fire protection measures to be considered while panning a building.

**Learning outcomes:**

At the end of the unit, students will be able to:

- Able to know the termite proofing technique to the building and protection form lightening effects.
- To be able to know the fire protection measure that are to be adopted while planning a building.

**UNIT-III**

Vertical transportation in a building: Types of vertical transportation-stairs-different forms of stairs- planning of stairs- other modes of vertical transportation – lifts-ramps-escalators.

**Learning outcomes:**

At the end of the unit, students will be able to:

- To be able to know the different modes of vertical transportation and their suitability

#### **UNIT-IV**

Prefabrication systems in residential buildings- walls-openings-cupboards-shelves etc., planning and modules and sizes of components in prefabrication. Planning and designing of residential buildings against the earthquake forces, principles, seismic forces and their effect on buildings.

##### **Learning outcomes:**

At the end of the unit, students will be able to:

- Identify the adoption of prefabricated elements in the building.
- Know the effect of seismic forces on buildings

#### **UNIT-V**

Acoustics – effect of noise – properties of noise and its measurements, principles of acoustics of building. Sound insulation- importance and measures.

##### **Learning outcomes:**

At the end of the unit, students will be able to:

- To know the effect of noise, its measurement and its insulation in planning the buildings

##### **Course Outcomes:**

After completion of the course the student will be able to

- Understand the principles in planning and design the buildings.
- Know the different methods of termite proofing in buildings.
- Know the different methods of vertical transportation in buildings.
- Know the implementation of prefabricated units in buildings and effect of earthquake on buildings.
- Know the importance of acoustics in planning and designing of buildings.

#### **TEXT BOOKS :**

1. Varghese, “Building construction”, PHI Learning Private Limited.
2. Punmia.B.C, “Building construction”, Jain.A.K and Jain.A.K Laxmi Publications.
3. S.P.Arora and S.P.Brndra “Building construction”, Dhanpat Rai and Sons Publications, New Delhi
4. “Building construction-Technical teachers training institute”, Madras, Tata McGraw Hill.

#### **REFERENCE BOOKS:**

1. National Building Code of India, Bureau of Indian Standards

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR**

**B.Tech (CSE) –III-I**

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**(19A02506a) ELECTRICAL ENGINEERING MATERIALS  
(OPEN ELECTIVE-I)**

**Course Objectives:**

To make the students learn about

- Classification of materials.
- Properties of materials and its applications.
- Domestic wiring and earthing

**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.

**Learning outcomes:**

At the end of the unit, students will be able to:

- Understand the classification of conducting materials.
- Analyze the properties of different conducting materials
- Apply the materials where it is applicable
- Know about electron configuration of atom

**UNIT-II Dielectric 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.

**Learning outcomes:**

At the end of the unit, students will be able to:

- Understand the classification of dielectric and high resistivity materials.
- Analyze the properties of dielectric and high resistivity materials
- Understand about concept of polarization and dipolar polarization
- Apply the materials where it is applicable

**UNIT-III Solid Insulating Materials**

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, thermo plastics. Resins, polystyrene, PVC, porcelain, glass, cotton and paper.

**Learning outcomes:**

At the end of the unit, students will be able to:

- Understand about various characteristics of solid insulating materials
- Understand the classification of solid insulating materials.
- Analyze the properties of solid insulating materials
- Apply the materials where it is applicable

**UNIT-IV Liquid & Gas Insulating Materials**

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 the unit, the student will be able to

- Understand the classification of liquid insulating materials.
- Analyze the properties of liquid insulating materials
- Apply the materials where it is applicable
- Understand about properties and classification of gaseous insulators

**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.

**Learning Outcomes:**

At the end of the unit, the student will be able to

- Understand about wiring materials and accessories
- Understand about earthing and wiring layout of domestic buildings
- Design and develop Residential wiring
- Know about godown wiring

**Course Outcomes:**

After completing the course, the student should be able to:

- Understand the classification of materials, domestic wiring materials and earthing.
- Analyze the properties of different electrical materials
- Apply where the materials are applicable based on properties of materials
- Design and develop Residential wiring, godown wiring and earthing.

**Text Books:**

1. G.K. Mithal, “Electrical Engineering Materials”, Khanna publishers, 2<sup>nd</sup> edition, 1991.
2. R.K. Rajput, A course in “Electrical Engineering Materials”, Laxmi publications, 2009.

**Reference Books:**

1. C.S. Indulkar and S. Thiruvengadam, “An Introduction to Electrical Engineering Materials” S Chand & Company, 2008.
2. Technical Teachers Training Institute, “Electrical engineering Materials”, 1<sup>st</sup> Edition, Madras, McGraw Hill Education, 2004.
3. by S.P. Seth, “A course in Electrical Engineering Materials Physics Properties & Applications”, Dhanapat Rai & Sons Publications, 2018.

**(19A03506a) INTRODUCTION TO HYBRID AND ELECTRIC VEHICLES**  
**OPEN ELECTIVE-I**

**Course Objectives:**

- 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**

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:**

After successful completion of this unit, the students will be able to

- Summarize the concepts of electrical vehicle propulsion and energy sources. (12)
- Identify the types of power sources for electrical vehicles.(13)
- Demonstrate the design considerations for propulsion system. (12)
- Solve the problems on tractive power and energy required. (13)

**UNIT II: Electric Vehicle Power Plant And Drives**

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:**

After successful completion of this unit, the students will be able to

- Choose a suitable drive scheme for developing an electric vehicles depending on resources.(11)
- List the various power electronic converters. (11)
- Describe the working principle dc/dc converters and buck boost convertor. (12)

- Explain about ac drives. (12)

### **UNIT III: Hybrid And Electric Drive Trains**

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.

#### **Learning Outcomes:**

After successful completion of this unit, the students will be able to

- Identify the social importance of hybrid vehicles. (13)
- Discuss impact of modern drive trains in energy supplies. (16)
- Compare hybrid and electric drive trains.(12)
- Analyze the power flow control and energy efficiency. (16)

### **UNIT IV: Electric and Hybrid Vehicles - Case Studies**

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:**

After successful completion of this unit, the students will be able to

- List the various electric and hybrid vehicles in the present market. (11)
- Discuss lightly hybridized vehicle and low voltage systems.(16)
- Explain about hybrid electric heavy duty vehicles and fuel cell heavy duty vehicles. (12)

### **UNIT V: Electric And Hybrid Vehicle Design :**

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:**

After successful completion of this unit, the students will be able to

- Illustrate matching the electric machine and the internal combustion engine. (12)
- Select the energy storage technology. (13)

- Select the size of propulsion motor. (13)
- Design and develop basic schemes of electric and hybrid electric vehicles. (13)

### **Course outcomes:**

After learning the course the students will be able to:

- Explain the working of hybrid and electric vehicles. (12)
- Choose a suitable drive scheme for developing an hybrid and electric vehicles depending on resources. (13)
- Develop the electric propulsion unit and its control for application of electric vehicles.(13)
- Choose proper energy storage systems for vehicle applications. (13)
- Design and develop basic schemes of electric vehicles and hybrid electric vehicles.(13)

### **Text Books :**

1. Iqbal Hussein, “Electric and Hybrid Vehicles: Design Fundamentals”, 2<sup>nd</sup> edition, 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.

### **References:**

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<sup>st</sup> edition, Wiley-Blackwell, 2018.

(19A03506b) **RAPID PROTOTYPING**  
**OPEN ELECTIVE-I**

**Course Objectives:**

- 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**

**10 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 the unit, the student will be able to

- Explain prototyping process. (12)
- Classify different rapid prototyping processes. (12)
- Summarize rp software's and represent a 3d model in stl format, other rp data formats. (12)

**UNIT – II**

**8 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 the 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. Ballistic Particle Manufacturing (BPM): Principle, Process, Advantages, Limitations, Applications. Shape Deposition Manufacturing (SDM): Principle, Process, Advantages, Limitations, Applications.

#### Learning Outcomes:

At the end of the 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 the 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 the 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)

### **Course Outcomes:**

At the end of the 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)

### **Text Books:**

1. Chua C.K., Leong K.F. and Lim C.S., “Rapid Prototyping: Principles and Applications”, 2<sup>nd</sup> edition, World Scientific Publishers, 2003.
2. Ian Gibson, David W. Rosen, Brent Stucker, “Additive Manufacturing Technologies: Rapid Prototyping to Direct Digital Manufacturing”, 1<sup>st</sup> 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.

**(19A04506a) ANALOG ELECTRONICS**  
**OPEN ELECTIVE-I**

**Course Objectives:**

- To understand the characteristics of various types of electronic devices and circuits (L1).
- To apply various principles of electronic devices and circuits to solve complex Engineering problems (L2).
- To analyze the functions of various types of electronic devices and circuits (L3).
- To evaluate the functions of various types of electronic devices and circuits in real time applications (L3).
- To design various types of electronic circuits for use in real time applications (L4).

**UNIT-I:**

**Diodes and Applications**

Properties of intrinsic and extrinsic semiconductor materials. Characteristics of PN junction diode and Zener diode. Applications of PN diode as a switch, rectifier and Zener diode as regulator. Special purpose diodes: Schottky diode, Tunnel diode, Varactor diode, photodiode and LED.

**Learning Outcomes:**

At the end of the unit, the student should be able to

- Understand the characteristics of various types of diodes (L1).
- Apply the principles of diodes to solve complex Engineering problems (L2).
- Analyze the functions of diodes in forward and reverse bias conditions (L3).
- Evaluate the functions of diodes in real time applications (L3).
- Design rectifiers and switches using diodes (L4).

**UNIT-II:**

**BJT and its Applications**

Construction, Operation, and Characteristics in CE, CB and CC configurations. Fixed-Bias and Voltage Divider-Bias. Applications as switch and amplifier.

**Learning Outcomes:**

At the end of the unit, the student should be able to

- Understand the characteristics and biasing of BJT (L1).

- Apply the principles of BJT to solve complex Engineering problems (L2).
- Analyse the functions of BJT in various configurations (L3).
- Evaluate the functions of BJT in real time applications (L3).
- Design amplifiers and switches using BJT (L4).

### **UNIT-III:**

#### **FETs and Applications**

**JFETs:**Construction, Operation, and Characteristics in CS configurations. Fixed-Bias and Voltage Divider -Bias. Applications as switch and amplifier.

**MOSFETs:**Construction, Operation, and Characteristics of Enhancement and Depletion modes in CS configurations. Biasing in Enhancement and Depletion modes. Applications as switch.

#### **Learning Outcomes:**

At the end of the unit, the student should be able to

- Understand the characteristics and biasing of FETs (L1).
- Apply the principles of FETs to solve complex Engineering problems (L2).
- Analyze the functions of FETs in CS configuration (L3).
- Evaluate the functions of FETs in real time applications (L3).
- Design amplifiers and switches using FETs (L4).

### **UNIT-IV:**

#### **Feedback Amplifiers and Oscillators**

**Feedback Amplifiers:** Concept of feedback, General characteristics of negative feedback amplifiers, Voltage-series, Current-series, Voltage-shunt, and Current-shunt feedback amplifiers.

**Oscillators:**Conditions for oscillations, Hartley and Colpitts oscillators, RC phase-shift and Wien-bridge oscillators.

#### **Learning Outcomes:**

At the end of the unit, the student should be able to

- Understand the concept of negative & positive feedback and characteristics feedback amplifiers (L1).
- Apply the principles of feedback amplifiers and oscillators to solve complex Engineering problems (L2).
- Analyze the functions of feedback amplifiers and oscillators (L3).
- Evaluate the functions of feedback amplifiers and oscillators in real time applications (L3).
- Design feedback amplifiers and oscillators for specific applications (L4).

### **UNIT-V:**

## **Wave-Shaping & Multivibrator Circuits and Linear Integrated Circuits**

**Wave-Shaping & Multivibrator Circuits:** Introduction, Waveform Shaping Circuits –RC and RL Circuits. Clippers, Comparator and Clampers. Bistable, Schmitt Trigger, Monostable and Astable Multivibrators.

**Linear Integrated Circuits:** Operational Amplifier: Introduction, Block diagram, Basic applications – Inverting, Non-inverting, Summing amplifier, Subtractor, Voltage Follower. IC 555 Timer and IC 7805 Regulator.

### **Learning Outcomes:**

At the end of the unit, the student should be able to

- Understand the operation of Wave-Shaping & Multivibrator Circuits and Linear Integrated Circuits (L1).
- Apply the principles of Wave-Shaping & Multivibrator Circuits and Linear Integrated Circuits to complex Engineering solve problems (L2).
- Analyse the functions of Wave-Shaping & Multivibrator Circuits and Linear Integrated Circuits (L3).
- Evaluate the functions of Wave-Shaping & Multivibrator Circuits and Linear Integrated Circuits in real time applications (L3).
- Design Wave-Shaping & Multivibrator Circuits and Linear Integrated Circuits for specific applications (L4).

Note: In all the units, only qualitative treatment is required.

### **Course Outcomes:**

At the end of the course, the student should be able to

- Understand the characteristics of various types of electronic devices and circuits
- Apply various principles of electronic devices and circuits to solve complex Engineering problems
- Analyse the functions of various types of electronic devices and circuits, Evaluate the functions of various types of electronic devices and circuits in real time applications
- Design various types of electronic circuits for use in real time applications.

### **TEXT BOOKS:**

1. S. Salivahanan and N. Suresh Kumar, “Electronic Devices and Circuits”, 4<sup>th</sup> Edition, McGraw Hill Education (India) Pvt Ltd., 2017.

### **REFERENCES:**

1. J. Milliman, Christos C Halkias, and Satyabrata Jit, “Electronics Devices and Circuits”, 4<sup>th</sup> Edition, McGraw Hill Education (India) Pvt Ltd., 2015.
  2. David A. Bell “Electronics Devices and Circuits”, 5<sup>th</sup> Edition, Oxford University Press, 2008.
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**Blooms’ learning levels:**

L1: Remembering and Understanding

L2: Applying

L3: Analyzing/Derive

L4: Evaluating/Design

L5: Creating

**(19A04506b) DIGITAL ELECTRONICS**  
**OPEN ELECTIVE-I**

**Course Objectives:**

- To introduce different methods for simplifying Boolean expressions
- To analyze logic processes and implement logical operations using combinational logic circuits
- To understand characteristics of memory and their classification.
- To understand concepts of sequential circuits and to analyze sequential systems in terms of state machines
- To understand concept of Programmable Devices

**UNIT- I**

Minimization Techniques and Logic Gates Minimization Techniques: Boolean postulates and laws – De-Morgan’s Theorem - Principle of Duality - Boolean expression - Minimization of Boolean expressions — Minterm – Maxterm - Sum of Products (SOP) – Product of Sums (POS) – Karnaugh map Minimization – Don’t care conditions – Quine - McCluskey method of minimization. Logic Gates: AND, OR, NOT, NAND, NOR, Exclusive–OR and Exclusive–NOR Implementations of Logic Functions using gates, NAND– NOR implementations – Multi level gate implementations- Multi output gate implementations. TTL and CMOS Logic and their characteristics – Tristate gates.

**Learning Outcomes:**

At the end of the unit, the student should be able to:

- Learn Boolean algebra and logical operations in Boolean algebra. (L1)
- Apply different logic gates to functions and simplify them. (L2)
- Analyze the redundant terms and minimize the expression using Kmaps and tabulation methods (L3)

**UNIT- II**

Combinational Circuits -Design procedure – Half adder – Full Adder – Half subtractor – Full subtractor – Parallel binary adder, parallel binary Subtractor – Fast Adder - Carry Look Ahead adder – Serial Adder/Subtractor - BCD adder – Binary Multiplier – Binary Divider - Multiplexer/ Demultiplexer – decoder - encoder – parity checker – parity generators – code converters - Magnitude Comparator.

**Learning Outcomes:**

At the end of the unit, the student should be able to:

- Apply the logic gates and design of combinational circuits(L2)
- Design of different combinational logic circuits(L4)

### **UNIT -III**

Sequential Circuits-Latches, Flip-flops - SR, JK, D, T, and Master-Slave – Characteristic table and equation –Application table – Edge triggering – Level Triggering – Realization of one flip flop using other flip flops – serial adder/subtractor- Asynchronous Ripple or serial counter – Asynchronous Up/Down counter - Synchronous counters – Synchronous Up/Down counters – Programmable counters – Design of Synchronous counters: state diagram- State table –State minimization –State assignment - Excitation table and maps-Circuit implementation - Modulo-n counter, Registers – shift registers - Universal shift registers – Shift register counters – Ring counter – Shift counters - Sequence generators.

#### **Learning Outcomes:**

At the end of the unit, the student should be able to:

- Understand the clock dependent circuits (L1)
- Identify the differences between clocked and clock less circuits, apply clock dependent circuits(L2)
- Design clock dependent circuits(L4)

### **UNIT -IV**

Memory Devices Classification of memories – ROM - ROM organization - PROM – EPROM – EEPROM –EAPROM, RAM – RAM organization – Write operation – Read operation – Memory cycle - Timing wave forms – Memory decoding – memory expansion – Static RAM Cell- Bipolar RAM cell – MOSFET RAM cell – Dynamic RAM cell –Programmable Logic Devices – Programmable Logic Array (PLA) - Programmable Array Logic (PAL) – Field Programmable Gate Arrays (FPGA) - Implementation of combinational logic circuits using ROM, PLA, PAL

#### **Learning Outcomes:**

At the end of the unit, the student should be able to:

- Understand the principle of operation of basic memory devices, and programmable logic devices. (L1)
- Implement combinational logic circuits using memory and programmable logic devices (L2)

### **UNIT -V**

Synchronous and Asynchronous Sequential Circuits Synchronous Sequential Circuits: General Model – Classification – Design – Use of Algorithmic State Machine – Analysis of Synchronous Sequential Circuits Asynchronous Sequential Circuits: Design of fundamental mode and pulse mode circuits – Incompletely specified State Machines – Problems in Asynchronous Circuits – Design of Hazard Free Switching circuits.

#### **Learning Outcomes:**

At the end of the unit, the student should be able to:

- Understand how synchronous and asynchronous sequential circuit works (L1)
- Understand the FSM and its design principles. (L1)
- Analyze the procedure to reduce the internal states in sequential circuits (L3)
- Illustrate minimization of complete and incomplete state machines and to write a minimal cover table(L2)

### **Course Outcomes:**

- Explain switching algebra theorems and apply them for logic functions, discuss about digital logic gates and their properties, Identify the importance of SOP and POS canonical forms in the minimization of digital circuits.
- Evaluate functions using various types of minimizing algorithms like Boolean algebra, Karnaugh map or tabulation method.
- Analyze the design procedures of Combinational & sequential logic circuits.
- Design of different combinational logic circuits, and compare different semiconductor memories.

### **Text Books:**

1. M. Morris Mano, “Digital Design”, 4th Edition, Prentice Hall of India Pvt. Ltd., 2008 / Pearson Education (Singapore) Pvt. Ltd., New Delhi, 2003.
2. Zvi Kohavi, “Switching and Finite Automata Theory”, 3<sup>rd</sup> Edition, South Asian Edition, 2010,

### **References:**

1. John F.Wakerly, “Digital Design”, Fourth Edition, Pearson/PHI, 2008
2. John.M Yarbrough, “Digital Logic Applications and Design”, Thomson Learning, 2006.
3. Charles H.Roth. “Fundamentals of Logic Design”, 6th Edition, Thomson Learning, 2013.
4. Donald P.Leach and Albert Paul Malvino, “Digital Principles and Applications”, 6th Edition, TMH, 2006.
5. Thomas L. Floyd, “Digital Fundamentals”, 10th Edition, Pearson Education Inc, 2011
6. Donald D.Givone, “Digital Principles and Design”, TMH, 2003.



**(19A27506a) BREWING TECHNOLOGY**  
**OPEN ELECTIVE - I**

**PREAMBLE**

This course covers the origin of brewing and ingredients used, methods and equipment used and innovations in this field.

**Course Objectives**

- To understand the Beer manufacturing, ingredients and their roles.
- To understand overall view of a brewing industry

**UNIT – I**

Introduction of brewing, history of brewing; Raw materials: barley, hops, water, yeast; Adjuncts for beer production: Maize, rice, millet, wheat, sugar etc. Malt production, role of enzymes for malting; Barley storage, steeping, germination, kilning, cooling, storage;

**Learning Outcomes:**

At the end of the unit, the student should be able to:

- Introduction of brewing, history of brewing
- Raw materials like barley, hops, water, yeast
- Adjuncts for beer production: Maize, rice, millet, wheat, sugar etc
- Malt production, role of enzymes for malting
- Barley storage, steeping, germination, kilning, cooling, storage

**UNIT – II**

Malt from other cereals, caramel malt, roasted malt, smoked malt, malt extract; Malt quality evaluation, Wort production, malt milling, Mashing, Mashing vessels; Wort boiling, clarification, cooling and aeration Enzyme properties, starch degradation, b-glucan degradation; Conversion of fatty matter, Biological acidification

**Learning Outcomes:**

At the end of the unit, the student should be able to:

- Malt from other cereals, caramel malt, roasted malt, smoked malt, malt extract

- Malt quality evaluation, Wort production, malt milling, Mashing, Mashing vessels
- Wort boiling, clarification, cooling and aeration Enzyme properties, starch degradation, b-glucan degradation
- Conversion of fatty matter, Biological acidification

### **UNIT – III**

Beer production methods, fermentation technology, changes during fermentation; Filtration procedure and equipment, beer stabilization conditions and durations, beer carbonation process; Packaging equipment and packaging materials, storage conditions and distribution process

#### **Learning Outcomes:**

At the end of the unit, the student should be able to:

- Beer production methods, fermentation technology, changes during fermentation
- Filtration procedure and equipment, beer stabilization conditions and durations, beer carbonation process
- Packaging equipment and packaging materials, storage conditions and distribution process

### **UNIT – IV**

Brewing Equipment. Grain mill, kettles, siphons, carboys, fermentation equipment, wort chillers, pumps beer bottles, cans, labels, bottle caps, sanitation equipments Preventive Production of beer against technology, ling phenomenon of beer, possible measures against staling reactions, oxidation

#### **Learning Outcomes:**

At the end of the unit, the student should be able to:

- Brewing Equipments like Grain mill, kettles, siphons, carboys, fermentation equipment, wort chillers
- pumps beer bottles, cans, labels, bottle caps, sanitation equipments
- Preventive Production of beer against technology, ling phenomenon of beer, possible measures against staling reactions, oxidation

### **UNIT – V**

Recent advances: Immobilized Cell Technology in Beer Production, immobilized yeast cell technology Energy management in the brewery and maltings; waste water treatment Automation and plant planning

#### **Learning Outcomes:**

At the end of the unit, the student should be able to:

- Immobilized Cell Technology in Beer Production, immobilized yeast cell technology
- Energy management in the brewery and maltings
- waste water treatment Automation and plant planning

### **Course Outcomes:**

By the end of this course, students will attain the:

- Knowledge of beer making, chemistry of ingredients used for brewing,
- Knowledge on brewing industry, Unit operations and equipments involved.

### **TEXT BOOKS**

1. Brewing: “Science and Practice, Brookes and Roger Stevens”, Dennis E. Briggs, Chris A. Boulton, Peter A. 2004, Woodhead publishing limited.
2. Die Deutsche “Bibliothek Technology: “Brewing and Malting”, Wolfgang Kunze. 2010, Bibliographic information published

### **REFERENCES**

1. “Handbook of Brewing”: Process, Technology, Markets, Hans Michael Eblinger. 2009, Wiley-VCH Verlag GmbH & Co.
2. Brewing: “New Technologies”, Charles W. Bamforth. 2006, Woodhead Pub.

**(19A27506b) COMPUTER APPLICATIONS IN FOOD INDUSTRY**  
**(OPEN ELECTIVE – I)**

**PREAMBLE**

This course covers all facets of computerization and various software's used and their usage.

**Course Objectives**

- Able to know about “The necessity of Software & their applications in Food Industries”
- Able to Implement the Programs in ‘C’ to perform various operations that are related to Food Industries.

**UNIT – I**

Computerization, Importance of Computerization in food industry and IT applications in food industries. Computer operating environments and information system for various types of food industries. Introduction to Bar charts and Pie charts & the procedure to develop bar charts and pie charts on given Data.

**Learning Outcomes:**

At the end of unit, students will be able to understand the following

- Computerization, Importance of Computerization in food industry and IT applications in food industries.
- Computer operating environments and information system for various types of food industries.
- Introduction to Barcharts and Piecharts & the procedure to develop barcharts and piecharts on given Data.

**UNIT – II**

Introduction to Software & Programming Languages, Properties, Differences of an Algorithm and Flowcharts, Advantages and disadvantages of Flowcharts & Algorithms. Introduction, Fundamentals & advantages of ‘C’. Steps in learning ‘C’ (Character set, Identifiers, Keywords) Steps in learning ‘C’ (Data types, Constants, Variables, Escape sequences).

**Learning Outcomes:**

At the end of unit, students will be able to understand the following

- Introduction to Software & Programming Languages, Properties, Differences of an Algorithm and Flowcharts
- Advantages and disadvantages of Flowcharts & Algorithms. Introduction, Fundamentals & advantages of 'C'.
- Steps in learning 'C' (Character set, Identifiers, Keywords)
- Steps in learning 'C' (Data types, Constants, Variables, Escape sequences).

### **UNIT – III**

Steps in learning 'C' (Operators, Statements) Steps in learning 'C' (Header Files, Input & Output functions: Formatted I/O functions, Unformatted I/O functions). Basic Structure of a simple 'C' program. Decision Making/Control Statements. Branching, Concept of Looping & Looping statements.

#### **Learning Outcomes:**

At the end of unit, students will be able to understand the following

- Steps in learning 'C' (Operators, Statements)
- Steps in learning 'C' (Header Files, Input & Output functions: Formatted I/O functions, Unformatted I/O functions).
- Basic Structure of a simple 'C' program. Decision Making/Control Statements.
- Branching, Concept of Looping & Looping statements.

### **UNIT – IV**

Concept of Functions (Defining a function & Function Prototypes, Types of functions: Library functions & User defined functions. Concept of various types of User Defined Functions (i.e., About 4 types). Concept of Arrays & Types of Arrays (Single, Double and Multi-Dimensional Arrays). Concept of a String Library Functions.

#### **Learning Outcomes:**

At the end of unit, students will be able to understand the following

- Concept of Functions (Defining a function & Function Prototypes, Types of functions: Library functions & User defined functions.
- Concept of various types of User Defined Functions (i.e., About 4 types).
- Concept of Arrays & Types of Arrays (Single, Double and Multi-Dimensional Arrays).
- Concept of a String Library Functions.

### **UNIT – V**

Concept of Pointers, Structures & Unions. Introduction to Data Structures, Types of Data Structures (Primary & Secondary Data Structures) Concept of Linked Lists, Types of Linked Lists & Basic operations on linked Lists. Concept of Stacks & Operations on Stacks (PUSH &

POP Operations) Concept of Queues and types of Queues Operations on a Queue (ENQUEUE & DEQUEUE Operations)

### **Learning Outcomes:**

At the end of unit, students will be able to understand the following

- Concept of Pointers, Structures & Unions. Introduction to Data Structures, Types of Data Structures (Primary & Secondary Data Structures)
- Concept of Linked Lists, Types of Linked Lists & Basic operations on linked Lists.
- Concept of Stacks & Operations on Stacks (PUSH & POP Operations)
- Concept of Queues and types of Queues Operations on a Queue (ENQUEUE & Dequeue Operations)

### **Course Outcomes**

By the end of the course, the students will be able to

- know about the various steps which are related to computer and Software and their application in Food Industries
- know about the various steps which are necessary to implement the programs in 'C'

### **TEXT BOOKS**

1. Yeswanth Kanethkar, Let us 'C'
2. Balaguruswamy E., "Computer Programming in 'C'"
3. Mark Allen Waise , "Data Structures"

### **REFERENCES**

1. M. S Excel 2000, Microsoft Corporation
2. M. S. Office – Microsoft Corporation
3. Verton M.V. "Computer concepts for Agri Business", AVI Pub. Corp., West Port, USA.

**(19A54506a) OPTIMIZATION TECHNIQUES**  
**(OPEN ELECTIVE-I)**

**Course Objectives:**

The student will be able to learn:

- The basic concepts of Optimization
- The emphasis of this course is on different classical Optimization techniques linear programming and simplex algorithms.
- About optimality of balanced transportation Problems
- About Constrained and unconstrained nonlinear programming.
- About principle of optimality and dynamic programming

**UNIT – I Introduction and Classical Optimization Techniques:**

Statement of an Optimization problem – design vector – design constraints – constraint surface – objective function – objective function surfaces – classification of Optimization problems. Classical Optimization Techniques: Single variable Optimization – multi variable Optimization without constraints – necessary and sufficient conditions for minimum/maximum – multivariable Optimization with equality constraints. Solution by method of Lagrange multipliers – multivariable Optimization with inequality constraints – Kuhn – Tucker conditions – Numerical examples.

**Learning Outcomes:**

At the end of unit, students will be able to understand the following

- To know how to formulate statement of optimization problem with or without constraints
- To know about classification of single and multivariable optimization problems
- To know about necessary and sufficient conditions in defining the optimization problems
- To understand how to formulate Kuhn-Tucker conditions and to solve numerical problems

**UNIT – II Linear Programming**

Standard form of a linear programming problem – geometry of linear programming problems – definitions and theorems – solution of a system of linear simultaneous equations – pivotal reduction of a general system of equations – motivation to the simplex method – simplex algorithm – Numerical examples.

**Learning Outcomes:**

At the end of unit, students will be able to understand the following

- To know about formulation of LPP

- To know about formulations of GPP
- To understand various theorems in solving simultaneous equations
- To understand about necessity of Simplex method and to solve numerical problems

### **UNIT – III Nonlinear Programming – One Dimensional Minimization methods**

Introduction, Unimodal function, Elimination methods- Unrestricted Search, Exhaustive Search, Dichotomous Search, Fibonacci Method, Golden Section Method and their comparison; Interpolation methods - Quadratic Interpolation Method, Cubic Interpolation Method and Direct Root Methods – Numerical examples.

#### **Learning Outcomes:**

At the end of unit, students will be able to understand the following

- To know about NLP in one dimensional optimization problems
- To understand about various search methods
- To learn about various interpolation methods
- To distinguish and compare the various elimination methods with numerical examples

### **UNIT – IV Unconstrained & Constrained Nonlinear Programming**

**Unconstrained Optimization Techniques:** Introduction- Classification of Unconstrained Minimization Methods, General Approach, Rate of Convergence, Scaling of Design Variables; Direct Search methods- Random Search Methods, Grid Search Method, Pattern Directions, Powell's Method and Simplex Method

**Constrained Optimization Techniques:** Introduction, Characteristics of a Constrained Problem, Direct Search Methods - Random Search Methods, Basic Approach in the Methods of Feasible Directions, Rosen's Gradient Projection Method, Generalized Reduced Gradient Method and Sequential Quadratic Programming.

#### **Learning Outcomes:**

At the end of unit, students will be able to understand the following

- To distinguish between unconstrained and constrained optimization problems
- To learn about direct search methods in unconstrained NLP problems and comparison
- To understand about direct search methods in constrained NLP problems and comparison
- To do exercises for solving numerical examples of various methods

### **UNIT – V Dynamic Programming**

Dynamic programming multistage decision processes – types – concept of sub optimization and the principle of optimality – computational procedure in dynamic programming – examples illustrating the calculus method of solution - examples illustrating the tabular method of solution – Numerical examples.

#### **Learning Outcomes:**



At the end of unit, students will be able to understand the following

- To know what is DP problem?
- To know about computational procedure in solving DPP
- To know Calculus and Tabular methods of solving with numerical examples of various methods

### **Course Outcomes:**

The student gets thorough knowledge on:

- Basic methods, principles in optimization
- Formulation of optimization models, solution methods in optimization
- Finding initial basic feasible solutions.
- Methods of linear and non-linear (constrained and unconstrained) programming.
- Applications to engineering problems.

### **TEXT BOOKS:**

1. S. S. Rao, "Engineering optimization": Theory and practice 3rd edition, New Age International (P) Limited, 1998.
2. H.S. Kasana & K.D. Kumar, "Introductory Operations Research Springer (India)", 2004.

### **REFERENCES:**

1. R Fletcher, "Practical Methods of Optimization" , 2<sup>nd</sup> Edition, Wiley Publishers, 2000.
2. Jorge Nocedal and Wright S, "Numerical Optimization Springer", 1<sup>st</sup> Edition, 1999.
3. by K.V. Mital and C. Mohan, "Optimization Methods in Operations Research and systems Analysis" 3<sup>rd</sup> Edition, New Age International (P) Limited, 1996.
4. by S.D. Sharma, "Operations Research", Kedar Nath, 2012.
5. by H.A. Taha, "Operations Research", 9<sup>th</sup> Edition, An Introduction Pearson, 2010.
6. G. Hadley, "Linear Programming", Narosa, 2002.

**(19A52506a) TECHNICAL COMMUNICATION AND PRESENTATION SKILLS**  
**(OPEN ELECTIVE)**

**Course Objectives:**

- To develop awareness in students of the relevance and importance of technical communication and presentation skills.
- To prepare the students for placements
- To sensitize the students to the appropriate use of non-verbal communication
- To train students to use language appropriately for presentations and interviews
- To enhance the documentation skills of the students with emphasis on formal and informal writing

**SYLLABUS**

**UNIT -1:**

**Basics of Technical Communication** – Introduction – Objectives & Characteristics of Technical Communication – Importance and need for Technical communication - LSRW Skills – Barriers to effective communication

**Learning Outcomes:**

At the end of the module, the learners will be able to

- Understand the importance of LSRW skills
- Identify and overcome the barriers to effective communication
- Realize the need and importance of technical communication

**UNIT -II**

**Informal and Formal Conversation** - Verbal and Non-verbal communication –Kinesics, Proxemics, Chronemics, Haptics, Paralanguage

**Learning Outcomes:**

At the end of the module, the learners will be able to

- State the difference between formal and informal conversation.
- Apply the knowledge of the difference between the verbal and non-verbal communication
- Evaluate the different aspects of non-verbal communication.

**UNIT -III**

**Written communication** – Differences between spoken and written communication – Features of effective writing –Advantages and disadvantages of spoken and written communication- Art of condensation- summarizing and paraphrasing

**Learning Outcomes:**

At the end of the module, the learners will be able to

- Know the difference between written and spoken communication
- Apply the awareness of features of effective writing.
- Implement the understanding of summarizing and paraphrasing.

**UNIT -IV**

**Presentation Skills** – Nature and importance of oral presentation – Defining the purpose – Analyzing the audience - Planning and preparing the presentation, organizing and rehearsing the presentation –Individual and group presentations - Handling stage fright

**Learning Outcomes:**

At the end of the module, the learners will be able to

- State the importance of presentation skills in corporate climate.
- Analyze the demography of the audience.
- Plan, prepare and present individual and group presentations.

**UNIT -V**

**Interview Skills** – The Interview process –Characteristics of the job interview – Pre-interview preparation techniques – Projecting the positive image – Answering Strategies

**Learning Outcomes:**

At the end of the module, the learners will be able to

- Identify the characteristics of the job interview.
- Understand the process of Interviews.
- Develop a positive image using strategies in answering FAQs in interviews

**Course Outcomes**

- Understand the importance of effective technical communication
- Apply the knowledge of basic skills to become good orators
- Analyze non-verbal language suitable to different situations in professional life
- Evaluate different kinds of methods used for effective presentations
- Create trust among people and develop employability skills

**TEXT BOOKS:**

1. Ashrif Rizvi, "Effective Technical Communication", TataMcGrahill, 2011
2. Meenakshi Raman & Sangeeta Sharma, "Technical Communication", 3<sup>rd</sup> Edition, O U Press 2015

**REFERENCES:**

1. Pushpalatha & Sanjay Kumar, "Communication Skills", Oxford Univsesity Press
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. Universities Press (India) Pvt Ltd., "Management Shapers Series", Himayatnagar, Hyderabad 2008.
5. John Hughes & Andrew Mallett, "Successful Presentations" Oxford.
6. Edgar Thorpe and Showick Thorpe, "Winning at Interviews" Pearson
7. Munish Bhargava, "Winning Resumes and Successful Interviews", McGraw Hill

(19A51506a) CHEMISTRY OF ENERGY MATERIALS

**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
- 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-1: Electrochemical Systems:** Galvanic cell, standard electrode potential, application of EMF, electrical double layer, dipole moments, polarization, Batteries-Lead-acid and Lithium ion batteries.

**Learning Outcomes:**

At the end of this unit, the students 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-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,.

**Learning Outcomes:**

At the end of this unit, the students 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-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.

**Learning Outcomes:**

At the end of this unit, the students 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 liquifaction methods (L2)

**UNIT-4: Solar Energy:** Solar energy introduction and prospects, photo voltaic (PV) technology, concentrated solar power (CSP), Solar Fuels, Solar cells.

**Learning Outcomes:**

At the end of this unit, the students 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-5: Photo and Photo electrochemical 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 students 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)

**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 7<sup>th</sup> 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

**(19A05502P) ARTIFICIAL INTELLIGENCE LABORATORY**

**Course Objectives:**

This course is designed to:

1. Explore the methods of implementing algorithms using artificial intelligence techniques
2. Illustrate search algorithms
3. Demonstrate building of intelligent agents

**List of Experiments:**

1. Write a program to implement DFS and BFS
3. Write a Program to find the solution for travelling salesman Problem
4. Write a program to implement Simulated Annealing Algorithm
5. Write a program to find the solution for wampus world problem
6. Write a program to implement 8 puzzle problem
7. Write a program to implement Towers of Hanoi problem
8. Write a program to implement A\* Algorithm
9. Write a program to implement Hill Climbing Algorithm
10. Build a Chatbot using AWS Lex, Pandora bots.
11. Build a bot which provides all the information related to your college.
12. Build a virtual assistant for Wikipedia using Wolfram Alpha and Python
13. The following is a function that counts the number of times a string occurs in another string:

```
# Count the number of times string s1 is found in string s2
def countsubstring(s1,s2):
    count = 0
    for i in range(0,len(s2)-len(s1)+1):
        if s1 == s2[i:i+len(s1)]:
            count += 1
    return count
```

For instance, countsubstring('ab', 'cabalaba') returns 2.

Write a recursive version of the above function. To get the rest of a string (i.e. everything but the first character).



14. Higher order functions. Write a higher-order function `count` that counts the number of elements in a list that satisfy a given test. For instance: `count(lambda x: x>2, [1,2,3,4,5])` should return 3, as there are three elements in the list larger than 2. Solve this task without using any existing higher-order function.

15. Brute force solution to the Knapsack problem. Write a function that allows you to generate random problem instances for the knapsack program. This function should generate a list of items containing  $N$  items that each have a unique name, a random size in the range  $1 \dots 5$  and a random value in the range  $1 \dots 10$ .

Next, you should perform performance measurements to see how long the given knapsack solver take to solve different problem sizes. You should perform at least 10 runs with different randomly generated problem instances for the problem sizes 10,12,14,16,18,20 and 22. Use a backpack size of  $2.5 \times N$  for each value problem size  $N$ . Please note that the method used to generate random numbers can also affect performance, since different distributions of values can make the initial conditions of the problem slightly more or less demanding.

How much longer time does it take to run this program when we increase the number of items? Does the backpack size affect the answer?

Try running the above tests again with a backpack size of  $1 \times N$  and with  $4.0 \times N$ .

16. Assume that you are organising a party for  $N$  people and have been given a list  $L$  of people who, for social reasons, should not sit at the same table. Furthermore, assume that you have  $C$  tables (that are infinitely large).

Write a function `layout(N,C,L)` that can give a table placement (ie. a number from  $0 \dots C-1$ ) for each guest such that there will be no social mishaps.

For simplicity we assume that you have a unique number  $0 \dots N-1$  for each guest and that the list of restrictions is of the form `[(X,Y), ...]` denoting guests  $X, Y$  that are not allowed to sit together. Answer with a dictionary mapping each guest into a table assignment, if there are no possible layouts of the guests you should answer `False`.

**References:**

1	Tensorflow: <a href="https://www.tensorflow.org/">https://www.tensorflow.org/</a>
2	Pytorch: <a href="https://pytorch.org/">https://pytorch.org/</a> <a href="https://github.com/pytorch">https://github.com/pytorch</a>
3	Keras: <a href="https://keras.io/">https://keras.io/</a> <a href="https://github.com/keras-team">https://github.com/keras-team</a>
4	Theano: <a href="http://deeplearning.net/software/theano/">http://deeplearning.net/software/theano/</a>

	<a href="https://github.com/Theano/Theano">https://github.com/Theano/Theano</a>
5	Cafee2: <a href="https://caffe2.ai/">https://caffe2.ai/</a> <a href="https://github.com/caffe2">https://github.com/caffe2</a>
6	Deeplearning4j: <a href="https://deeplearning4j.org/">https://deeplearning4j.org/</a>
7	Scikit-learn: <a href="https://scikit-learn.org/stable/">https://scikit-learn.org/stable/</a> <a href="https://github.com/scikit-learn/scikit-learn">https://github.com/scikit-learn/scikit-learn</a>
8	Deep Learning.Ai: <a href="https://www.deeplearning.ai/">https://www.deeplearning.ai/</a>
9	OpenCv: <a href="https://opencv.org/">https://opencv.org/</a> <a href="https://github.com/qqwweee/keras-yolo3">https://github.com/qqwweee/keras-yolo3</a>
10	YOLO: <a href="https://www.pyimagesearch.com/2018/11/12/yolo-object-detection-with-opencv/">https://www.pyimagesearch.com/2018/11/12/yolo-object-detection-with-opencv/</a> nVIDIA: CUDA <a href="https://developer.nvidia.com/cuda-math-library">https://developer.nvidia.com/cuda-math-library</a>
11	David Poole, Alan Mackworth, Randy Goebel, "Computational Intelligence : a logical approach", Oxford University Press, 2004.
12	G. Luger, "Artificial Intelligence: Structures and Strategies for complex problem solving", Fourth Edition, Pearson Education, 2002.
13	J. Nilsson, "Artificial Intelligence: A new Synthesis", Elsevier Publishers, 1998.
14	Artificial Neural Networks, B. Yagna Narayana, PHI
15	Artificial Intelligence , 2nd Edition, E.Rich and K.Knight, TMH.
16	Artificial Intelligence and Expert Systems, Patterson, PHI.

### Course Outcomes:

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

1. Implement search algorithms (L3)
2. Solve Artificial intelligence problems (L3)
3. Design chatbot and virtual assistant (L6)

**(19A05504P) Computer Networks Laboratory**  
**(Common to CSE & IT)**

Course Objectives:

This course is designed to:

- Understand the different types of networks
- Discuss the software and hardware components of a network
- Enlighten the working of networking commands supported by operating system
- Impart knowledge of Network simulator 2/3
- Familiarize the use of networking functionality supported by JAVA
- Familiarize with computer networking tools.

List of Experiments

1. Study different types of Network cables (Copper and Fiber) and prepare cables (Straight and Cross) to connect Two or more systems. Use crimping tool to connect jacks. Use LAN tester to connect the cables.

Install and configure Network Devices: HUB, Switch and Routers. Consider both manageable and non-manageable switches. Do the logical configuration of the system. Set the bandwidth of different ports.

Install and Configure Wired and Wireless NIC and transfer files between systems in Wired LAN and Wireless LAN. Consider both adhoc and infrastructure mode of operation.

2. Work with the commands Ping, Tracert, Ipconfig, pathping, telnet, ftp, getmac, ARP, Hostname, Nbtstat, netdiag, and Nslookup

3. Use Sniffers for monitoring network communication (Ethereal)

4. Find all the IP addresses on your network. Unicast, Multicast, and Broadcast on your network.

5. Use Packet tracer software to build network topology and configure using Distance vector routing protocol.

6. Use Packet tracer software to build network topology and configure using Link State routing protocol.

7. Using JAVA RMI Write a program to implement Basic Calculator

8. Implement a Chatting application using JAVA TCP and UDP sockets.

9. Hello command is used to know whether the machine at the other end is working or not. Echo command is used to measure the round trip time to the neighbour. Implement Hello and Echo commands using JAVA.

10. Use Ethereal tool to capture the information about packets.

11. Install Network Simulator 2/3. Create a wired network using dumbbell topology. Attach agents, generate both FTP and CBR traffic, and transmit the traffic. Vary the data rates and evaluate the performance using metric throughput, delay, jitter and packet loss.

12. Create a static wireless network. Attach agents, generate both FTP and CBR traffic, and transmit the traffic. Vary the data rates and evaluate the performance using metric throughput, delay, jitter and packet loss.

13. Create a mobile wireless network. Attach agents, generate both FTP and CBR traffic, and transmit the traffic. Vary the data rates and evaluate the performance using metric throughput, delay, jitter and packet loss.

### **Course outcomes:**

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

- Design scripts for Wired network simulation (L6)
- Design scripts of static and mobile wireless networks simulation (L6)
- Analyze the data traffic using tools (L4)
- Design JAVA programs for client-server communication (L6)
- Construct a wired and wireless networks using the real hardware (L3)

### **Reference Books:**

1. Shivendra S.Panwar, Shiwen Mao, Jeong-dong Ryoo, and Yihan Li, "TCP/IP Essentials A Lab-Based Approach", Cambridge University Press, 2004.
2. Cisco Networking Academy, "CCNA1 and CCNA2 Companion Guide", Cisco Networking Academy Program, 3<sup>rd</sup> edition, 2003.
3. Ns Manual, Available at: <https://www.isi.edu/nsnam/ns/ns-documentation.html>, 2011.
4. Elloitte Rusty Harold, "Java Network Programming", 3<sup>rd</sup> edition, O'REILLY, 2011.

### Course Objectives:

This course is designed to:

- Understand and define the context and the external interaction with the System
- Identify the principle objects in the system
- Develop the design models
- Familiarize with usage of open source UML Case tools
- Apply testing tools Viz. Cobertura, JMeter...

### Laboratory Experiments

1. Initial Familiarization to a UML CASE tool such as the free tool Argo UML
2. Drawing Class diagram for a very simple problem such as the following in Argo UML and generating skeletal code in Java and C++
  - A country has a capital city
  - A dining philosopher uses a fork
  - A file is an ordinary file or a directory file
  - Files contain records
  - A class can have several attributes
  - A relation can be association or generalization
  - A polygon is composed of an ordered set of points
  - A person uses a computer language on a project
3. Use UML tool (such as Argo UML) for use case modeling for a given problem
4. Use UML tool (such as Argo UML) for development of domain model for a given problem
5. Use UML tool (such as Argo UML) to develop sequence and collaboration diagrams for a given problem [**2 Classes**]
6. Use UML tool (such as Argo UML) to develop state model for a given problem
7. Generate C++/Java skeletal code for the design solution developed for a given problem
8. Complete the skeletal code generated by UML tool (such as Argo UML) to generate complete code [**2 Classes**]
9. Perform class level testing and measure coverage using tools such as Cobertura
10. Develop integration test cases from Sequence diagram and perform integration testing.
11. Perform performance testing using tools such as JMeter

### Course Outcomes

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

1. Design use case, sequence and collaboration diagrams (L6)
2. Develop the different models to document an Object-oriented design.(L3)
3. Demonstrate class level and system integration testing (L2)

**Text Book:**

1. Rajib Mall, “Fundamentals of Software Engineering”, 5th Edition, PHI, 2018 (Chapters 7 and 8)

**Reference Books:**

1. Rumbaugh and Blaha, Object-oriented Modeling and design with UML, Pearson, 2007
2. Bernd Bruegge and, Allen H. Dutoit, Object-Oriented Software Engineering Using UML, Patterns, and Java, Pearson, 2009

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR**  
**B.Tech (CSE) – III-I Sem** **L T P C**  
**3 0 0 0**  
**(19A99501) MANDATORY COURSE: CONSTITUTION OF INDIA**

**Course Objectives :**

The objective of this course is

- To Enable the student to understand the importance of constitution
- To understand the structure of executive, legislature and judiciary
- To understand philosophy of fundamental rights and duties
- 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.
- To understand the central-state relation in financial and administrative control

**Syllabus**

**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:-**

After completion of this unit student will

- Understand the concept of Indian constitution
- Apply the knowledge on directive principle of state policy
- Analyze the History and features of Indian constitution
- Learn about Preamble, Fundamental Rights and Duties

**UNIT-II**

Union Government and its Administration Structure of the Indian Union - Federalism - Centre-State relationship – President’s 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:-**

After completion of this unit student will

- Understand the structure of Indian government
- Differentiate between the state and central government
- Explain the role of President and Prime Minister
- Know the Structure of supreme court and High court

### **UNIT-III**

State Government and its Administration - Governor - Role and Position -CM and Council of ministers - State Secretariat-Organization Structure and Functions

#### **Learning Outcomes:-**

After completion of this unit student will

- Understand the structure of state government
- Analyze the role of Governor and Chief Minister
- Explain the role of State Secretariat
- Differentiate between structure and functions of state secretariat

### **UNIT-IV**

Local Administration - District's Administration Head - Role and Importance - Municipalities - Mayor and role of Elected Representatives -CEO of Municipal Corporation Pachayati Raj - Functions- PRI -Zilla Parishath - Elected officials and their roles - CEO,Zilla Parishath - Block level Organizational Hierarchy - (Different departments) - Village level - Role of Elected and Appointed officials - Importance of grass root democracy

#### **Learning Outcomes:-**

After completion of this unit student will

- Understand the local Administration
- Compare and contrast district administration's role and importance
- Analyze the role of Mayor and elected representatives of Municipalities
- Learn about the role of Zilla Parishath block level organization

### **UNIT-V**

Election Commission - Election Commission- Role of Chief Election Commissioner and Election Commissionerate - State Election Commission -Functions of Commissions for the welfare of SC/ST/OBC and Women

#### **Learning Outcomes:-**



After completion of this unit student will

- Know the role of Election Commission
- Contrast and compare the role of Chief Election commissioner and Commissionerate
- Analyze the role of state election commission
- Evaluate various commissions viz SC/ST/OBC and women

### **Course Outcomes:**

At the end of the course, students will be able to

- Understand historical background of the constitution making and its importance for building a democratic India.
- Understand the functioning of three wings of the government i.e., executive, legislative and judiciary.
- Understand the value of the fundamental rights and duties for becoming good citizen of India.
- Analyze the decentralization of power between central, state and local self-government
- Apply the knowledge in strengthening of the constitutional institutions like CAG, Election Commission and UPSC for sustaining democracy.

### **TEXT BOOKS**

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

### **REFERENCES:**

1. J.A. Siwach, “Dynamics of Indian Government & Politics”.
2. H.M.Sreevai, “Constitutional Law of India”, 4<sup>th</sup> edition in 3 volumes (Universal Law Publication)
3. J.C. Johari, “Indian Government and Politics”, Hans India
4. M.V. Pylee, “Indian Constitution Durga Das Basu, Human Rights in Constitutional Law, Prentice”, Hall of India Pvt. Ltd.. New Delhi

### **E-RESOURCES:**

- 1.[nptel.ac.in/courses/109104074/8](http://nptel.ac.in/courses/109104074/8)
- 2.[nptel.ac.in/courses/109104045/](http://nptel.ac.in/courses/109104045/)
- 3.[nptel.ac.in/courses/101104065/](http://nptel.ac.in/courses/101104065/)
- 4.[www.hss.iitb.ac.in/en/lecture-details](http://www.hss.iitb.ac.in/en/lecture-details)
- 5.[www.iitb.ac.in/en/event/2nd-lecture-institute-lecture-series-indian-constitution](http://www.iitb.ac.in/en/event/2nd-lecture-institute-lecture-series-indian-constitution)

(19A05601) CRYPTOGRAPHY AND NETWORK SECURITY  
(Common to CSE & IT)

**Course Objectives:**

This course is designed to:

- Introduce the basic categories of threats to computers and networks
- Illustrate various cryptographic algorithms.
- Demonstrate public-key cryptosystem.
- Discuss the fundamental ideas of public-key cryptography.
- Explore Web security threats and protection mechanisms

**UNIT – I**

**Attacks on Computers and Computer Security:** Introduction, The need for security, Security approaches, Principles of security, Types of Security attacks, Security services, Security Mechanisms, A model for Network Security

**Cryptography: Concepts and Techniques:** Introduction, plain text and cipher text, substitution techniques, transposition techniques, encryption and decryption, symmetric and asymmetric key cryptography, steganography, key range and key size, possible types of attacks.

**Learning Outcomes**

At the end of the unit, students will be able to:

- Identify different types of Attacks (L3)
- Interpret various cryptography techniques (L5)
- Distinguish between cryptography and steganography (L4)

**UNIT – II**

**Symmetric key Ciphers:** Block Cipher principles & Algorithms (DES, AES, Blowfish), Differential and Linear Cryptanalysis, Block cipher modes of operation, Stream ciphers, RC4, Location and placement of encryption function, Key distribution

**Asymmetric key Ciphers:** Principles of public key cryptosystems, Algorithms (RSA, Diffie-Hellman, ECC), Key Distribution

**Learning Outcomes**

At the end of the unit, students will be able to:

- Differentiate symmetric and asymmetric ciphers (L4)
- Explain the principles of public key cryptography (L2)
- Select the appropriate cryptographic algorithm based on the requirements and applications. (L5)

**UNIT – III**

**Message Authentication Algorithms and Hash Functions:** Authentication requirements, Functions, Message authentication codes, Hash Functions, Secure hash algorithm, Whirlpool, HMAC, CMAC, Digital signatures, knapsack algorithm.

### **Learning Outcomes**

At the end of the unit, students will be able to:

- Summarize authentication techniques (L2)
- Apply Hash algorithm for generating Digital signatures (L3)

### **UNIT – IV**

**E-Mail Security:** Pretty Good Privacy, S/MIME

**IP Security:** IP Security overview, IP Security architecture, Authentication Header, encapsulating security payload, combining security associations, key management.

### **Learning Outcomes**

At the end of the unit, students will be able to:

- Extend security for emails (L2)
- Examine IP security mechanisms (L4)

### **UNIT – V**

**Web Security:** Web security considerations, Secure Socket Layer and Transport Layer Security, Secure electronic transaction

**Intruders, Virus and Firewalls:** Intruders, Intrusion detection, password management, Virus and related threats, Countermeasures, Firewall design principles, Types of firewalls

**Case Studies on Cryptography and security:** Secure Inter-branch Payment Transactions, Cross site Scripting Vulnerability, Virtual Elections.

### **Learning Outcomes**

At the end of the unit, students will be able to:

- Design secure electronic transactions (L6)
- Explain different types of Firewalls (L2)

### **Course Outcomes:**

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

- Identify various type of vulnerabilities of a computer network (L2)
- Outline various security algorithms (L4)
- Design secure systems (L6)
- Investigate the threats and identify the solutions for threats (L4)

### **TEXT BOOKS:**

1. William Stallings, “Cryptography and Network Security”, 5<sup>th</sup> Edition, Pearson Education, 2011.
2. Atul Kahate, “Cryptography and Network Security”, 2<sup>nd</sup> Edition, Mc Graw Hill, 2010.
3. Bernard Menezes “Network Security and Cryptography”, 1<sup>st</sup> Edition, CENGAGE Learning, 2010.

**REFERENCES:**

1. C K Shyamala, N Harini, Dr T R Padmanabhan, Wiley India, “Cryptography and Network Security”, 1<sup>st</sup> Edition, Wiley India Pvt Ltd, 2011.
2. ForouzanMukhopadhyay “Cryptography and Network Security”, 2<sup>nd</sup> Edition , Mc Graw Hill, 2010.
3. Mark Stamp, Wiley India, “Information Security, Principles and Practice”, 2<sup>nd</sup> Edition, Wiley, 2011.

**(19A05602T) BIG DATA ANALYTICS**  
**(Common to CSE & IT)**

The course is designed to

- Understand the basic concepts and importance of Big Data
- Familiarize with the installation of Hadoop and how to analyze the Big Data
- Understand the design concepts of HDFS
- Provide good insight for developing a MapReduce applications
- Understand Hadoop environment.
- Explore the concepts of Pig, Hive, Spark and HBase

**UNIT-I**

**Introduction to Big Data:**What is Big Data? Why Big Data is Important? Meet Hadoop, Data, Data Storage and Analysis, Comparison with other systems, History of Apache Hadoop, Hadoop Ecosystem, VMWare Installation of Hadoop. Analyzing the Data with Hadoop, Scaling Out.

**Learning Outcomes:**

At the end of the unit, students will be able to:

- Identify the characteristics of datasets. (L3)
- Compare trivial data and big data for various applications. (L4)
- Choose and implement various ways of selecting suitable model parameters.(L1)

**UNIT- II**

**HDFS:** The Design of HDFS, HDFS Concepts, The Command-Line Interface, Hadoop File systems, The Java Interface, Data flow.

**MapReduce:** Developing a MapReduce application, The Configuration API, Setting up the Development Environment, Running Locally on Test Data, Running on a Cluster

**Learning Outcomes:**

At the end of the unit, students will be able to:

- Understand and apply scaling up Hadoop techniques and associated technologies.(L2)
- Estimate suitable test data. (L5)
- Apply the MapReduce application on a cluster.(L3)

**UNIT-III**

**How MapReduce Works:** Anatomy of a MapReduce, Job Run, Failures, Shuffle and Sort, Task Execution.

**MapReduce Types and Formats:**MapReduce Types, Input formats, output formats.

**Learning Outcomes:**

At the end of the unit, students will be able to:

- Explore the Anatomy of MapReduce. (L5)
- Illustrate various input and output formats of MapReduce. (L2)
- List various MapReduce types.(L1)

#### **UNIT-IV**

**Hadoop Environment:** Setting up a Hadoop Cluster, Cluster specification, Cluster Setup and Installation, Hadoop Configuration, Security.

**Pig:** Installing and Running Pig, an Example, Comparison with Databases, Pig Latin, User-Defined Functions, Data Processing Operators.

#### **Learning Outcomes:**

At the end of the unit, students will be able to:

- Show the cluster setup and installation.(L2)
- Demonstrate the Configure the Hadoop.(L2)
- Compare Hadoop with various Databases.(L5)

#### **UNIT-V**

**Hive:** Installing Hive, Running Hive, Comparison with traditional Databases, HiveQL, Tables, Querying Data.

**Spark:** Installing Spark, Resilient Distributed Datasets, Shared Variables, Anatomy of a Spark Job Run.

**HBase:** HBasics, Installation, clients, Building an Online Query Application.

#### **Learning Outcomes:**

At the end of the unit, students will be able to:

- Explain various frameworks of Big Data. (L2)
- Compare Hive with traditional Databases.(L4)
- Learn how to build an online query application.(L1)

#### **Course Outcomes:**

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

- Explain the concepts and challenges of big data (L2)
- Determine why existing technologies are inadequate to analyze the large data. (L5)
- Outline the operations viz. Collect, manage, store, query, and analyze various forms of big data. (L2)
- Apply large-scale analytic tools to solve some of the open big data problems. (L3)
- Analyze the impact of big data for business decisions and strategies.(L4)
- Design different big data applications. (L6)

#### **Text Books:**

1. Tom White, “Hadoop: The Definitive Guide”Fourth Edition, O’reilly Media, 2015.

2. Big Data, Big Analytics: Emerging business intelligence and analytic trends for today's businesses, Michael Minnelli, Michelle Chambers, and Ambiga Dhiraj, Wiley Cio Series

**Reference Books:**

1. Glenn J. Myatt, Making Sense of Data , John Wiley & Sons, 2007 Pete Warden, Big Data Glossary, O'Reilly, 2011.
2. Michael Berthold, David J. Hand, Intelligent Data Analysis, Spingers, 2007.
3. Chris Eaton, Dirk DeRoos, Tom Deutsch, George Lapis, Paul Zikopoulos, Understanding Big Data : Analytics for Enterprise Class Hadoop and Streaming Data, McGraw Hill Publishing, 2012.
4. Anand Rajaraman and Jeffrey David Ullman, Mining of Massive Datasets Cambridge University Press, 2012.

### **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 skills in academic/ workplace contexts. The shift is from learning about the language to using the language. They should be 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.

### **Course Objectives**

- Facilitate active listening to enable inferential learning through expert lectures and talks
- Impart critical reading strategies for comprehension of complex texts
- Provide training and opportunities to develop fluency in English through participation in formal group discussions and presentations using audio-visual aids
- Demonstrate good writing skills for effective paraphrasing, argumentative essays and formal correspondence
- Encourage use of a wide range of grammatical structures and vocabulary in speech and writing

### **UNIT - I**

#### **Text:**

1. **Lines Composed a Few Miles above Tintern Abbey - William Wordsworth**
2. **The Lotos-Eaters - Alfred Tennyson**

**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 the module, the learners 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
- Apply the knowledge of structure and style in a presentation, identify the audience and make note of key points
- Make formal structured presentations on general topics using grammatical understanding
- Prioritize information from reading texts after selecting relevant and useful points
- Paraphrase short academic texts using suitable strategies and conventions

## UNIT-II

**Text: The Model Millionaire – Oscar Wilde**

**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, précis writing, letter and note-making

**Grammar and Vocabulary:** Subject-verb agreement, noun-pronoun agreement, collocations.

### Learning Outcomes

At the end of the module, the learners will be able to

- Comprehend academic lectures, take notes and answer questions
- Make formal structured presentations on academic topics
- Distinguish facts from opinions while reading
- Summarize and make a précis of reports
- Use correct English avoiding common errors in formal speech and writing

## UNIT – III

**Text: Speech at IIM Calcutta – Azim Premji**

**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 the module, the learners will be able to

- Critically follow and participate in a discussion
- Participate in group discussions using appropriate conventions and language strategies
- Comprehend complex texts and identify the author's purpose
- Produce logically coherent argumentative essays
- Use appropriate vocabulary to express ideas and opinions

#### **UNIT -IV**

##### **Text: A Biography of Steve Jobs**

**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 the module, the learners will be able to:

- Draw inferences and conclusions using prior knowledge and verbal cues
- Express thoughts and ideas with acceptable accuracy and fluency
- Develop advanced reading skills for deeper understanding of texts
- Prepare a cv and write a cover letter to seek internship/ job
- Understand the use of technical vocabulary in academic writing

#### **UNIT -V**

##### **Text: How I Became a Public Speaker - George Bernard Shaw**

**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 clichés and jargons.

#### **Learning Outcomes:**

At the end of the module, the learners will be able to

- Develop advanced listening skills for in-depth understanding of academic texts
- Collaborate with a partner to make effective presentations
- Understand and apply the structure of project reports
- Demonstrate ability to use grammatically correct structures and a wide range of vocabulary

## **Course Outcomes**

At the end of the course, the learners will be able to

- Understand the context, topic, and pieces of specific information from social or transactional dialogues spoken by native speakers of English
- Apply grammatical structures to formulate sentences and correct word forms
- Analyze discourse markers to speak clearly on a specific topic in informal discussions
- Evaluate reading/listening texts and to write summaries based on global comprehension of these texts.
- Create a coherent paragraph interpreting a figure/graph/chart/table

## **Prescribed Book**

1. Forging Ahead: A Course Book for B.Tech Students. Orient BlackSwan, 2020.

## **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; 2<sup>nd</sup> 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)

**(19A05603a) COMPILER DESIGN**  
**(Professional Elective-II)**

**COURSE OBJECTIVES:**

The Course is designed to:

- Understand the System Programming concepts viz. assemblers, loaders, linkers and editors
- Introduce the basic principles of the compiler construction
- Explain the Concept of Context Free Grammars, Parsing and various Parsing Techniques.
- Explore the process of intermediate code generation.
- Illustrate the process of Code Generation and various Code optimization techniques.

**Unit-I:**

**Introduction to Systems Software:** Basic Assembler functions, Machine Dependant Assembler features, Machine Independent Assembler features, Basic Loader functions, Machine Dependant Loader features, Machine Independent Loader features, Text Editors, Language processors, The Structure of a Compiler.

**A Simple Syntax-Directed Translator:** Introduction, Syntax Definition, Syntax-Directed Translation, Parsing, A Translator for Simple Expressions, Lexical Analysis, Symbol Tables, Intermediate Code Generation.

Learning Outcomes:

- Recognize the importance of Systems software (L1)
- Identify the phases of a Compiler (L3)
- Outline the syntax rules (L2)

**Unit-II:**

**Lexical Analysis:** The Role of the Lexical Analyzer, Input Buffering, Specification of Tokens, Recognition of Tokens, The Lexical-Analyzer Generator Lex, Finite Automata, From Regular Expressions to Automata, Design of a Lexical-Analyzer Generator, Optimization of DFA-Based Pattern Matchers.

**Learning Outcomes**

- Identify the tokens in a program. (L3)
- Explain the process of lexical analysis (L2)

**Unit – III:**

**Syntax Analysis:** Introduction, Context-Free Grammars, Writing a Grammar, Writing a Grammar, Bottom-Up Parsing, Introduction to LR Parsing: Simple LR, More Powerful LR Parsers, Using Ambiguous Grammars, Parser Generators.

## **Learning Outcomes**

- Examine the syntax of program constructs (L4)
- Evaluate the correctness of a program (L5)

## **Unit – IV:**

**Syntax-Directed Translation:** Syntax-Directed Definitions, Evaluation orders for SDD's, Application of SDT, SDT schemes, Implementing L-attribute SDD's.

**Intermediate Code Generation:** Variants of Syntax Trees, Three address code, Translation of Expressions, Control Flow

## **Learning Outcomes**

- Explain the process of syntax directed translation (L1)
- Develop intermediate code (L6)

## **Unit-V:**

**Code Generation:** Issues in the Design of a Code Generator, The Target Language, Addresses in the Target Code, A Simple Code Generator, Peephole Optimization, Register Allocation and Assignment, Instruction Selection by Tree Rewriting, Optimal Code Generation for Expression, Dynamic Programming Code-Generation, The Principal Sources of Optimizations.

## **Learning Outcomes**

- Generate code (L6)
- Create optimized code (L6)

## **Course Outcomes:**

Students will be able to:

- Differentiate the various phases of a compiler (L4).
- Identify the tokens and verify the code (L4)
- Design code generator (L6)
- Apply code optimization techniques (L3)
- Design a compiler for a small programming language (L6)

## **Text Books :**

1. Leland L. Beck, "System Software – An Introduction to Systems Programming", 3<sup>rd</sup> Edition, Pearson Education Asia, 2008.
2. Alfred V. Aho, Monica S. Lam, Ravi Sethi, Jeffrey D. Ullman, "Compilers Principles, Techniques and Tools", 2<sup>nd</sup> Edition, Pearson.

## **Reference Books**

1. Yunlin Su, Song Y. Yan, “Principles of Compilers”, Springer, 2012.
2. Andrew W. Appel, “Modern Compiler Implementation in JAVA”, 2<sup>nd</sup> edition, Cambridge University Press, 2004.

**(19A05603b) INTRODUCTION TO MACHINE LEARNING**

**Professional Elective-II**  
**(Common to CSE & IT)**

**Course Objectives:**

This course is designed to:

- Understand the basic theory underlying machine learning
- Formulate machine learning problems corresponding to different applications.
- Illustrate a range of machine learning algorithms along with their strengths and weaknesses
- Apply machine learning algorithms to solve problems of moderate complexity.
- Understand how Machine Learning imbibes the philosophy of Human learning.

**UNIT I**

Introduction: Learning Problems – Perspectives and Issues – Concept Learning – Version Spaces and Candidate Eliminations – Inductive bias – Decision Tree learning – Representation – Algorithm – Heuristic Space Search.

Learning Outcomes:

At the end of the unit, students will be able to:

- Explore how to build computer programs that improve their performance at some task through experience. (L6).
- Interpret Decision tree learning as practical methods for inductive inference. (L2)

**UNIT II**

NEURAL NETWORKS AND GENETIC ALGORITHMS: Neural Network Representation – Problems – Perceptrons – Multilayer Networks and Back Propagation Algorithms – Advanced Topics – Genetic Algorithms – Hypothesis Space Search – Genetic Programming – Models of Evolution and Learning.

Learning Outcomes:

At the end of the unit, students will be able to:

- Appraise artificial neural networks as one of the most effective learning methods currently known to interpret complex real-world sensor data,. (L5).
- Illustrates the use of the genetic algorithm approach, and examine the nature of its hypothesis space search.(L2)

**UNIT III**

**BAYESIAN AND COMPUTATIONAL LEARNING:** Bayes Theorem – Concept Learning – Maximum Likelihood – Minimum Description Length Principle – Bayes Optimal Classifier – Gibbs Algorithm – Naïve Bayes Classifier – Bayesian Belief Network – EM Algorithm – Probability Learning – Sample Complexity – Finite and Infinite Hypothesis Spaces – Mistake Bound Model.

Learning Outcomes:

At the end of the unit, students will be able to:

- Illustrate the principles of Probability for classification as an important area of Machine Learning Algorithms. (L2)
- Analyze sample complexity and computational complexity for several learning Problems (L4)

#### **UNIT IV**

**INSTANCE BASED LEARNING:** K- Nearest Neighbor Learning – Locally weighted Regression – Radial Bases Functions – Case Based Learning.

Learning Outcomes:

At the end of the unit, students will be able to:

- Infer that the Instance based algorithms can be used to overcome memory complexity and overfitting problems. (L2).

#### **UNIT V**

**ADVANCED LEARNING :** Learning Sets of Rules – Sequential Covering Algorithm – Learning Rule Set – First Order Rules – Sets of First Order Rules – Induction on Inverted Deduction – Inverting Resolution – Analytical Learning – Perfect Domain Theories – Explanation Base Learning – FOCL Algorithm – Reinforcement Learning – Task – Q-Learning – Temporal Difference Learning

Learning Outcomes:

At the end of the unit, students will be able to:

- Infer that the combined methods outperform both purely inductive and purely analytical learning methods. (L2)
- Recognize the importance of Reinforcement Learning in the industry.

#### **Course Outcomes:**

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

- Identify machine learning techniques suitable for a given problem. (L3)
- Solve the real world problems using various machine learning techniques. (L6 )
- Apply Dimensionality reduction techniques for data preprocessing. (L3)
- Explain what is learning and why it is essential in the design of intelligent machines. (L2)



- Implement Advanced learning models for language, vision, speech, decision making etc. (L1)

**Text Books:**

- 1) T.M. Mitchell, “Machine Learning”, McGraw-Hill, 1997.

**Reference Books:**

- 1) Ethern Alpaydin, “Introduction to Machine Learning”, MIT Press, 2004.
- 2) Stephen Marsland, “Machine Learning -An Algorithmic Perspective”, Second Edition, Chapman and Hall/CRC Machine Learning and Pattern Recognition Series, 2014.
- 3) Andreas C. Müller and Sarah Guido “Introduction to Machine Learning with Python: A Guide for Data Scientists”, Oreilly.

**e-Resources:**

- 1) Andrew Ng, “Machine Learning Yearning”  
<https://www.deeplearning.ai/machine-learning-yearning/>
- 2) Shai Shalev-Shwartz , Shai Ben-David, “Understanding Machine Learning: From Theory to Algorithms” , Cambridge University Press  
<https://www.cse.huji.ac.il/~shais/UnderstandingMachineLearning/index.html>

**(19A05603c) REAL TIME SYSTEMS**  
**Professional Elective-II**  
**(Common to CSE & IT)**

**Course Objectives:**

The Course is designed to:

- Understand the requirements of Real Time Operating Systems.
- Illustrate Real Time features using case studies.
- Describe how a real-time operating system kernel is implemented.

**UNIT – I**

**Introduction:** Introduction to UNIX/LINUX, Overview of Commands, File I/O,( open, create, close, lseek, read, write), Process Control ( fork, vfork, exit, wait, waitpid, exec).

**UNIT - II**

**Real Time Operating Systems:** Brief History of OS, Defining RTOS, The Scheduler, Objects, Services, Characteristics of RTOS, Defining a Task, asks States and Scheduling, Task Operations, Structure, Synchronization, Communication and Concurrency. Defining Semaphores, Operations and Use, Defining Message Queue, States, Content, Storage, Operations and Use

**UNIT - III**

**Objects, Services and I/O:** Pipes, Event Registers, Signals, Other Building Blocks, Component Configuration, Basic I/O Concepts, I/O Subsystem

**UNIT - IV**

**Exceptions, Interrupts and Timers:** Exceptions, Interrupts, Applications, Processing of Exceptions and Spurious Interrupts, Real Time Clocks, Programmable Timers, Timer Interrupt Service Routines (ISR), Soft Timers, Operations.

**UNIT - V**

**Case Studies of RTOS:** RT Linux, MicroC/OS-II, Vx Works, Embedded Linux, and Tiny OS.

**Course Outcomes:**

Students will be able to:

1. Explain real-time concepts such as preemptive multitasking, task priorities, priority inversions, mutual exclusion, context switching, and synchronization, interrupt latency and response time, and semaphores. (L2)
2. Describe how tasks are managed. (L1)
3. Discuss how tasks can communicate using semaphores, mailboxes, and queues. (L6)

4. Build a real-time system on an embedded processor.(L6)
5. Examine the real time operating systems like RT Linux, Vx Works, MicroC /OSII, Tiny OS (L4)

**TEXT BOOK:**

1. Real Time Concepts for Embedded Systems – Qing Li, Elsevier, 2011

**REFERENCE BOOKS:**

1. Embedded Systems- Architecture, Programming and Design by Rajkamal, 2007, TMH.
2. Advanced UNIX Programming, Richard Stevens
3. Embedded Linux: Hardware, Software and Interfacing – Dr. Craig Hollabaugh

**(19A05603d) ADVANCED COMPUTER ARCHITECTURE**

**Professional Elective-II**  
**(Common to CSE & IT)**

**Prerequisites:** Computer Organization

**Course Objectives**

The Course is designed to:

- Impart the concepts and principles of parallel and advanced computer architectures.
- Develop the design techniques of Scalable and multithreaded Architectures.
- Apply the concepts and techniques of parallel and advanced computer architectures to design modern computer systems

**UNIT - I**

Theory of Parallelism, Parallel computer models, The State of Computing, Multiprocessors and Multicomputers, Multivector and SIMD Computers, PRAM and VLSI models, Architectural development tracks, Program and network properties, Conditions of parallelism, Program partitioning and Scheduling, Program flow Mechanisms, System interconnect Architectures.

**UNIT - II**

Principals of Scalable performance, Performance metrics and measures, Parallel Processing applications, Speed up performance laws, Scalability Analysis and Approaches, Hardware Technologies, Processes and Memory Hierarchy, Advanced Processor Technology, Superscalar and Vector Processors, Memory Hierarchy Technology, Virtual Memory Technology.

**UNIT - III**

Bus Cache and Shared memory, Backplane bus systems, Cache Memory organizations, Shared-Memory Organizations, Sequential and weak consistency models, Pipelining and superscalar techniques, Linear Pipeline Processors, Non-Linear Pipeline Processors, Instruction Pipeline design, Arithmetic pipeline design, superscalar pipeline design.

**UNIT - IV**

Parallel and Scalable Architectures, Multiprocessors and Multicomputers, Multiprocessor system interconnects, cache coherence and synchronization mechanism, Three Generations of Multicomputers, Message-passing Mechanisms, Multivector and SIMD computers, Vector Processing Principals, Multivector Multiprocessors, Compound Vector processing, SIMD computer Organizations, The connection machine CM-5

**UNIT - V**

Scalable, Multithreaded and Dataflow Architectures, Latency-hiding techniques, Principals of

Multithreading, Fine-Grain Multicomputers, Scalable and multithreaded Architectures, Dataflow and hybrid Architectures.

**Course Outcomes:**

Students will be able to:

- Explain Computational models and Computer Architectures.(L2)
- Elaborate the Concepts of parallel computer models.(L6)
- Define Scalable Architectures, Pipelining, Superscalar processors, multiprocessors (L1)

**TEXT BOOK:**

1. Advanced Computer Architecture Second Edition, Kai Hwang, Tata McGraw Hill Publishers.

**REFERENCE BOOKS:**

1. Computer Architecture, Fourth edition, J. L. Hennessy and D.A. Patterson. ELSEVIER.

R18 B.Tech. CSE Syllabus JNTU HYDERABAD

2. Advanced Computer Architectures, S.G. Shiva, Special Indian edition, CRC, Taylor & Francis.

3. Introduction to High Performance Computing for Scientists and Engineers, G. Hager and G. Wellein, CRC Press, Taylor & Francis Group.

4. Advanced Computer Architecture, D. Sima, T. Fountain, P. Kacsuk, Pearson education.

5. Computer Architecture, B. Parhami, Oxford Univ. Press.

**(19A05603e) Computer Vision**  
**Professional Elective-II**  
**(Common to CSE & IT)**

**COURSE OBJECTIVES:**

The Course is designed to:

- Understand shape and region analysis
- Illustrate Hough Transform and its applications to detect lines, circles, ellipses
- Explain three-dimensional image analysis techniques
- Describe motion analysis
- Study some applications of computer vision algorithms

**UNIT I IMAGE PROCESSING FOUNDATIONS:**

Review of image processing techniques – classical filtering operations – thresholding techniques – edge detection techniques – corner and interest point detection – mathematical morphology – texture

**UNIT II SHAPES AND REGIONS:**

Binary shape analysis – connectedness – object labeling and counting – size filtering – distance functions – skeletons and thinning – deformable shape analysis – boundary tracking procedures – active contours – shape models and shape recognition – centroidal profiles – handling occlusion – boundary length measures – boundary descriptors – chain codes – Fourier descriptors – region descriptors – moments

**UNIT III HOUGH TRANSFORM:**

Line detection – Hough Transform (HT) for line detection – foot-of-normal method – line localization – line fitting – RANSAC for straight line detection – HT based circular object detection – accurate center location – speed problem – ellipse detection – Case study: Human Iris location – hole detection – generalized Hough Transform (GHT) – spatial matched filtering – GHT for ellipse detection – object location – GHT for feature collation

**UNIT IV 3D VISION AND MOTION:**

Methods for 3D vision – projection schemes – shape from shading – photometric stereo – shape from texture – shape from focus – active range finding – surface representations – point-based representation – volumetric representations – 3D object recognition – 3D reconstruction – introduction to motion – triangulation – bundle adjustment – translational alignment – parametric motion – splinebased motion – optical flow – layered motion

**UNIT V APPLICATIONS:**

Application: Photo album – Face detection – Face recognition – Eigen faces – Active appearance and 3D shape models of faces Application: Surveillance – foreground-background

separation – particle filters – Chamfer matching, tracking, and occlusion – combining views from multiple cameras – human gait analysis Application: In-vehicle vision system: locating roadway – road markings – identifying road signs – locating pedestrians

### **Course Outcomes:**

Students will be able to:

- Apply fundamental image processing techniques required for computer vision (L3)
- Illustrate shape analysis (L2)
- Evaluate boundary tracking techniques (L5)
- Apply chain codes and other region descriptors (L3)
- Apply 3D vision techniques (L3)
- Develop applications using computer vision techniques (L6)

### **REFERENCES:**

1. D. L. Baggio et al., “Mastering OpenCV with Practical Computer Vision Projects”, Packt Publishing, 2012.
2. E. R. Davies, “Computer & Machine Vision”, Fourth Edition, Academic Press, 2012.
3. Jan Erik Solem, “Programming Computer Vision with Python: Tools and algorithms for analyzing images”, O’Reilly Media, 2012.
4. Mark Nixon and Alberto S. Aquado, “Feature Extraction & Image Processing for Computer Vision”, Third Edition, Academic Press, 2012.
5. R. Szeliski, “Computer Vision: Algorithms and Applications”, Springer 2011.
6. Simon J. D. Prince, “Computer Vision: Models, Learning, and Inference”, Cambridge University Press, 2012.

**(19A01604a) INDUSTRIAL WASTE AND WASTE WATER MANAGEMENT**  
**OPEN ELECTIVE-II**

**Course Objectives:**

- To teach Health and Environment Concerns in waste water management
- To teach material balance and design aspects of the reactors used in waste water treatment.
- To impart knowledge on selection of treatment methods for industrial waste water
- To teach common methods of treatment in different industries
- To provide knowledge on operational problems of common effluent treatment plant

**UNIT –I**

**Industrial water Quantity and Quality requirements:**

Boiler and cooling waters–Process water for Textiles, Food processing, Brewery Industries, power plants, fertilizers, sugar mills Selection of source based on quality, quantity and economics. Use of Municipal wastewater in Industries – Adsorption, Reverse Osmosis, Ion Exchange, Ultra filtration, Freezing, Elutriation, Removal of Colour, Odour and Taste.

**Learning Outcomes:**

At the end of the unit, students will be able to:

- Learn the procedures for assessment of quality of Industrial water
- Suggest different processes of handling waste water

**UNIT –II**

**Basic theories of Industrial Wastewater Management:** Industrial waste survey - Measurement of industrial wastewater Flow-generation rates – Industrial wastewater sampling and preservation of samples for analysis -Wastewater characterization-Toxicity of industrial effluents-Treatment of wastewater-unit operations and processes-Volume and Strength reduction – Neutralization and Equalization, Segregation and proportioning- recycling, reuse and resources recovery

**Learning Outcomes:**

At the end of the unit, students will be able to:

- Measure industrial waste water flow
- Characterize waste water
- Suggest techniques for treatment of waste water.



### UNIT –III

**Industrial wastewater disposal management:** Discharges into Streams, Lakes and oceans and associated problems, Land treatment - Common Effluent Treatment Plants: advantages and suitability, Limitations and challenges- Recirculation of Industrial Wastes- Effluent Disposal Method

#### Learning Outcomes:

At the end of the unit, students will be able to:

- Understand options for waste water disposal.
- Explain functioning of common effluent treatment plants

### UNIT – IV

**Process and Treatment of specific Industries-1:** Manufacturing Process and origin, characteristics, effects and treatment methods of liquid waste from Steel plants, Fertilizers, Textiles, Paper and Pulp industries, Oil Refineries, Coal and Gas based Power Plants

#### Learning Outcomes:

At the end of the unit, students will be able to:

- Understand the character of waste water from Steel plants and refineries
- Suggest suitable waste water treatment techniques

### UNIT – V

**Process and Treatment of specific Industries-2:** Manufacturing Process and origin, characteristics, effects and treatment methods of liquid waste from Tanneries, Sugar Mills, Distillers, Dairy and Food Processing industries, Pharmaceutical Plants

#### Learning Outcomes:

At the end of the unit, students will be able to:

- Understand the character of waste water from tanneries and distilleries
- Suggest suitable waste water treatment techniques

#### Course Outcomes:

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

- Design treatment methods for any industrial wastewater.
- Examine the manufacturing process of various industries.
- Assess need for common effluent treatment plant for an industry
- Test and analyze BOD, COD, TSS and MPN in waste water.

**TEXT BOOK**

1. M. N. Rao and A. K. Dutta, “Wastewater Treatment”, Oxford & IBH, New Delhi.
2. K.V. S. G. Murali Krishna, “Industrial Water and Wastewater Management”.

**REFERENCES**

1. A. D. Patwardhan, “Industrial Wastewater treatment”, PHI Learning, Delhi
2. Metcalf and Eddy Inc., “Wastewater Engineering”, Tata McGraw Hill co., New Delhi.
3. G. L. Karia & R.A. “Christian Wastewater Treatment- Concepts and Design Approach”, Prentice Hall of India.

**(19A01604b) BUILDING SERVICES AND MAINTAINANCE**  
**OPEN ELECTIVE-II**

**Course Objectives:**

- To impart knowledge in concepts of building maintenance
- To insist the student to observe various practices of good building maintenance
- To teach the importance safety in buildings
- To demonstrate the use of ventilation in buildings.
- To give the list of different types of machineries in buildings

**UNIT – I**

**PLUMBING SERVICES:** Water supply system- fixing of pipes in buildings – maintenance of buildings- water meters-sanitary fittings-design of building drainage- gas supply systems

**Learning Outcomes:**

At the end of the unit, students will be able to:

- Understand water supply system
- Understand the building drainage system.

**UNIT – II**

**VENTILATION:** Necessity of ventilation – functional requirements – systems of ventilation-natural ventilation-artificial ventilation-air conditioning-systems of air conditioning-essentials of air conditioning-protection against fire caused by air conditioning systems.

**Learning Outcomes:**

At the end of the unit, students will be able to:

- Understand concepts of ventilation
- Understand concepts of air conditioning

**UNIT – III**

**THERMAL INSULATION:** Heat transfer system-thermal insulating materials-methods of thermal insulation-economics of thermal insulation-thermal insulation of exposed walls, doors, windows and roofs.

**Learning Outcomes:**

At the end of the unit, students will be able to:

- Understand methods of insulation
- Understand materials of insulation

#### **UNIT – IV**

**FIRE SAFETY:** Causes of fire in buildings-fire safety regulations-characteristics of fire resisting materials- fire resistant construction-heat and smoke detectors-fire alarms-fire fighting pump and water storage.

#### **Learning Outcomes:**

At the end of the unit, students will be able to:

- Understand safety regulations of fire system
- Know about the implementation and usage of various fire resistant materials in building construction

#### **UNIT – V**

**MACHINERIES IN BUILDINGS:** Lifts-essential requirements-design considerations-escalators-essential requirements-electrical installations in buildings-lighting in buildings-methods of electrical wiring-earthing

#### **Learning Outcomes:**

At the end of the unit, students will be able to:

- Understanding of different machineries of buildings
- Understanding of electrical installation of buildings

#### **Course Outcomes:**

Student will be able to understand

- Concepts of plumbing, drainage system and gas supply system
- Concepts of ventilation and air conditioning
- Concepts of thermal insulation and economics of thermal insulation
- Concepts of fire safety in buildings and fire resistant construction
- Concepts of different machineries of buildings

#### **TEXT BOOKS:**

1. B.C.Punmia, Er. Ashok K jain, Arun K Jain “Building construction”, Laxmi publications pvt.ltd. New Delhi.
2. Janardhan Jah, S.K Sinha, “Building construction”, Khanna publishers
3. Rangwala, “Building construction”, Charoathar publishing house.

**REFERENCE BOOKS:**

1. David V Chaddrton, “Building services engineering”, Outledge
2. P.C Varghees “Building construction”, Printice hall india

**(19A02604a) INDUSTRIAL AUTOMATION**  
**OPEN ELECTIVE-II**

**Course Objectives:**

- To understand the basic concepts of Automation
- To understand the concepts of automation cycle and hardware components
- To gain knowledge about pneumatic and hydraulic devices
- To understand the concepts of sensors and actuators
- To know the use of Robotics used in industries automation

**UNIT -I:**

**Introduction to Automation**

Definition and fundamentals of automation, reasons for Automating, basic elements of an automated system: Power, Program and control system, safety, maintenance & repair diagnosis, error detection and recovery, Automation principles and strategies: USA principle, strategies of automation and production system, automation migration strategy

**Learning Outcomes:**

At the end of the unit, students will be able to:

- To understand the fundamental concepts of automation and its basic elements
- To understand system safety requirements
- To understand about maintenance and repair strategies
- To know about production system automation

**UNIT- II:**

**Mechanization and Automation**

Basic principles of Mechanization and automation, product cycle, hard Vs flexible automation, Capital- intensive Vs low cost automation. Types of systems-mechanical, electrical, hydraulic, pneumatic and hybrid systems, Automation using CAMS, Geneva mechanisms, gears etc. Assembly line Automation: automated assembly systems, transfer systems, vibratory bowl feeders, non-vibratory feeders, part orienting, feed track, part placing & part escapement systems. Introduction to Material storage/ handling and transport systems, and its automation using AS/RS, AGVS and conveyors etc.

**Learning Outcomes:**

At the end of the unit, students will be able to:

- To know about how to analyse the various automation methods

- To know about assembling and placing of various parts
- To distinguish between mechanization and automation of systems
- To know about material storage, handling and automation using various approaches

### **UNIT -III:**

#### **Pneumatics and hydraulics**

Hydraulic and pneumatic devices-Different types of valves, Actuators and auxiliary elements in Pneumatics & hydraulics , their applications and use of their ISO symbols. Synthesis and design of circuits (up to 3 cylinders)–pneumatic, electro pneumatics and hydraulics. Design of Electro-Pneumatic Circuits using single solenoid and double solenoid valves; with and without grouping.

#### **Learning Outcomes:**

At the end of the unit, students will be able to:

- To know design of various pneumatic and hydraulic components
- To understand about synthesis and design of Pneumatic circuits
- To understand about electro pneumatic circuits
- To design using various solenoid valves with and without grouping

### **UNIT -IV:**

#### **Sensors & Actuators Sensors**

Selection of sensors (Displacement, temperature, acceleration, force /pressure) based on static and dynamic characteristics. Interfacing: Concept of interfacing, bit accuracy and sampling speed, amplifying electronics, and microcontroller. Actuators: Principle and selection of electro mechanical actuators (1) DC motors (2) Stepper Motors (3) Solenoid Actuators (4) Servo Motors (5) BLDC

#### **Learning Outcomes:**

At the end of the unit, students will be able to:

- To know about selection of sensors and actuators based on dynamic characteristics
- To understand about necessity of interfacing sensors with Microcontroller
- To understand principle and selection of actuators
- To apply various electro mechanical actuators to certain machines

### **UNIT- V:**

#### **Robots and their applications**

Introduction to robots, Types, Classifications, Selection of robots, Robot Degrees of freedom, Robot configuration, Accuracy and repeatability, Specification of a robot, Robot feedback controls: Point to point control and Continuous path control, Control system for robot joint,

Adaptive control, Drives and transmission systems, End effectors, Industrial robot applications of robots

### **Learning Outcomes:**

At the end of the unit, students will be able to:

- To know about Robots, classification, selection and specifications
- To understand the use of robotics in industrial applications
- To know about various feedback controls of Robot
- To understand how adaptive control strategies can be used in Robots

### **Course Outcomes:**

1. Understand the basic concepts of Industrial automation
2. Design and analysis of automation methods, placing and assembling of various parts
3. Design of various processing and control circuits using pneumatic and hydraulic elements
4. Selection of sensors based on the industrial application
5. Role of robotics in industrial applications

### **TEXT BOOKS:**

1. Stamatis Manesis and George Nikolakopoulos, "Introduction to Industrial Automation", CRC Press, 2018.
2. Frank Lamb, "Industrial Automation", Hands on, Mc Graw Hill Education, 2013.

### **REFERENCES:**

1. Richerd L. Shell and Ernest L. Hall, "Hand Book of Industrial Automation", CRC Press, 2000.



**(19A02604b) SYSTEM RELIABILITY CONCEPTS**  
**(OPEN ELECTIVE-II)**

**Course Objectives:**

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**

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 the unit, students will be able to:

- To know about basic rules for probabilities of events
- To distinguish between pdf and cdf
- Get detailed information about Probability of failure density and distribution functions
- Obtain the expected value and standard deviation for binomial distribution.

**UNIT-II:**

**Network Modeling and Reliability Evaluation**

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 the unit, students will be able to:

- How to find the Probability of success and failures of network using different approaches for series-parallel configurations.
- Classification of redundancies.
- To find reliability / unreliability of complex systems using different methods
- Comparison of approaches to solve probability index of SISO system

### **UNIT-III:**

#### **Time Dependent Probability**

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 the unit, the student will be able to

- Understand the concepts of time domain functions and relationship between them.
- Obtain the expected value and standard deviation for exponential distribution.
- Obtain the values of probabilistic measures for series and parallel configurations.
- To obtain probabilistic measures for fully redundant and partially redundant configurations

### **UNIT-IV:**

#### **Discrete Markov Chains & Continuous Markov Processes**

**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 the unit, the student will be able to

- Understand the concepts of Stochastic Transitional Probability Matrix, Limiting State Probability
- To know about evaluation for one and two component repairable models.
- Understand the concept of Frequency balance approach.
- To distinguish between Markov chains and Markov processes

## **UNIT-V:**

### **Multi Component & Approximate System Reliability Evaluation**

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 the unit, the student will be able to

- Understand the concepts of recursive relation for evaluation of equivalent transitional rates.
- Obtain the cumulative probability and cumulative frequency for different systems
- To know about computation of basic probability indices for series, parallel configurations
- To know how to evaluate basic probability indices using cut set approach

#### **Course Outcomes:**

After completing the course, the student should be able to do the following:

- Understand the concepts for combining Probabilities of events, Bernoulli’s trial, and Binomial distribution.
- Network Reliability/Unreliability using conditional probability, path and cutset based approach, complete event tree and reduced event tree methods.
- Understanding Reliability functions and to develop relationship between these functions, expected value and standard deviation of Exponential distribution and measures of reliabilities.
- Analyze the time dependent reliability evaluation of single component repairable model, frequency and duration concepts, Frequency balance approach.
- Recursive relation for evaluation of equivalent transitional rates, cumulative probability and cumulative frequency and ‘n’ component repairable model.

#### **Text Books:**

1. Roy Billinton and Ronald N. Allan, “Reliability Evaluation of Engineering Systems”, Reprinted in India B. S. Publications, 2007.
2. E. Balagurusamy, “Reliability Engineering”, Tata McGraw Hill, 2003.

#### **Reference Books:**

1. E. E. Lewis , “Introduction to Reliability Engineering” Wiley Publications.
2. Charles E. Ebeling, “Reliability and Maintainability Engineering”, Tata McGraw Hill, 2000.

3. by Ajit Kumar Verma, Srividya Ajit and Durga Rao Karanki, Springer, “Reliability and Safety Engineering” 2<sup>nd</sup> edition, 2016.
4. Rausand and Arnljot Hoyland, “System Reliability Theory Marvin”, Wiley Publications.

(19A03604a) INTRODUCTION TO MECHATRONICS  
OPEN ELECTIVE

**Course Objectives:**

- Familiarize the technologies behind modern mechatronic systems.
- Explain fundamentals for the development of fully automated system.
- Develop a robotic or automated systems focusing on the hardware and software integration.
- Demonstrate the development and design of mechatronic system and MEMS.

**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.

**Learning Outcomes:**

At the end of the unit, the student will be able to

- Explain the role of mechatronics in industry.(12)
- Identify the application of mechatronics in automation industry.(13)

**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.

**Learning Outcomes:**

At the end of the unit, the student will be able to

- Classify various types of sensors. (12)
- Choose sensors for particular application. (13)
- Measure different quantity's using sensors. (14)

**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.

### **Learning Outcomes:**

At the end of the unit, the student will be able to

- Classify various actuation systems. (I2)
- Choose the criterion for different actuators. (I1)

### **UNIT – IV**

**Microprocessors, Microcontrollers and Programmable Logic Controllers:** Architecture 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 controllers.

### **Learning Outcomes:**

At the end of the unit, the student will be able to

- Understand the architecture of microprocessors, microcontrollers and PLC. (L2)
- Formulate various programs using PLC. (L6)

### **UNIT – V**

Design of mechatronics systems, Mechatronics design elements, Traditional mechatronics systems, Embedded systems, Procedure for designing a mechatronic systems.

### **Learning Outcomes:**

At the end of the unit, the student will be able to

- Understanding design of mechatronics . (L2)
- Various Mechatronics systems. (L4)
- Design Aspects of Mechatronic systems. (L2)

### **Course Outcomes**

Upon successful completion of this unit, the student will be able to:

- Explain mechatronics systems in industry. (I2)
- Identify mechatronic systems encountered in practice. (I3)
- Examine the components of a typical mechatronic system. (I4)
- Compare the various techniques used for development of mems. (I4)
- Develop programs using plc. (I6)

### **Text books:**

1. Er R. Rajput, “ A Text book of Mechatronics”, S.Chand,2<sup>nd</sup> edition-2016.
2. James J Allen, “Micro Electro Mechanical Systems Design”, CRC Press Taylor & Francis group, 2005.

**Reference Text books:**

1. WBolton, “Mechatronics Electronics Control Systems in Mechanical and Electrical Engineering”, 3<sup>rd</sup> edition, Pearson Education Press, 2005.
2. Devadas Shetty and Richard A Kolk, “Mechatronic System Design”, 2<sup>nd</sup> edition, Cengage learning, 2010.
3. Clarence W. de Silva, “Mechatronics an Integrated Approach”, CRC Press, 2004.
4. Ganesh S Hedge, “Mechatronics”, Jones & Bartlett Learning, 2010.

**(19A03604b) OPTIMIZATION TECHNIQUES THROUGH MATLAB**  
**OPEN ELECTIVE-II**

**Course Objectives**

- 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 -I**

**Introduction to MATLAB:** Overview, MATLAB Preliminaries, Basics of MATLAB, Beyond the Basics of MATLAB, Popular Functions and Commands, Plotting using MATLAB, Optimization with MATLAB.

**Learning Outcomes:**

After completion of this unit, students 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:** 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:**

After completion of this unit, students will be able to

- Build optimization problem. (I1)
- Solve various optimization problems(13)
- Compare convex and concave programming (14)

**UNIT -III**

**Single Variable Optimization:** Finite difference method, Central difference method, Runge-Kutta method, interval halving method, golden section method with MATLAB code.

**Learning Outcomes:**

After completion of this unit, students will be able to

- Understand various methods involving single variable optimization. (12)



- Develop codes in matlab for different methods. (13)
- Identify methods for solving a single variable optimization problem. (13)

#### UNIT- IV

**Multi Variable Optimization:** Conjugate gradient method, Newton's method, Powell's method, Fletcher- Reeves method, Hook and Jeeves method, interior penalty function with MATLAB code.

#### Learning Outcomes:

After completion of this unit, students will be able to

- Apply various methods involving multi variable optimization. (12)
- Develop codes in matlab for solving various multi variable optimization problems. (13)
- Choose methods for solving a multi variable optimization problem. (13)

#### 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.

#### Learning Outcomes:

After completion of this unit, students will be able to

- Apply different types of genetic algorithms. (13)
- Model optimization problems using genetic algorithms in matlab. (13)
- Compare different genetic algorithms for performance. (15)

#### Course Outcomes:

After completion of this course the student can be able to

- Use optimization terminology and concepts, and understand how to classify an optimization problem.(14)
- Apply optimization methods to engineering problems.(13)
- Implement optimization algorithms.(13)
- Compare different genetic algorithms. (15)
- Solve multivariable optimization problems. (14)

#### 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<sup>nd</sup> edition. Elsevier, 2004.

**REFERENCES:**

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<sup>th</sup> edition, McGraw-Hill Education, 2018.

(19A04604a) **BASICS OF VLSI**  
**OPEN ELECTIVE-II**

**Course Objectives:**

The objectives of the course are to

- Learn and Understand IC Fabrication process steps required for various MOS circuits
- Understand and Experience VLSI Design Flow
- Learn Transistor-Level CMOS Logic Design
- Understand VLSI Fabrication and Experience CMOS Physical Design
- Learn to Analyze Gate Function and Timing Characteristics

**UNIT – I**

**Introduction:** Introduction to MOS Technology – MOS, PMOS, NMOS, CMOS and BiCMOS technologies, fabrication fundamentals: Oxidation, Lithography, Diffusion, Ionimplantation, Metallization and Encapsulation.

**Basic Electrical Properties:** Basic Electrical Properties of MOS, CMOS and BiCMOS Circuits,  $I_{DS}$ - $V_{DS}$  relationships, MOS transistor threshold Voltage,  $g_m$ ,  $g_{ds}$ , figure of merit  $\omega_0$ , Pass transistor, NMOS inverter, Various pull - ups, Determination of pull-up to pulldown ratio ( $Z_{pu} / Z_{pd}$ ), CMOS Inverter analysis and design, BiCMOS inverters, Latch-up in CMOS circuits.

**Learning Outcomes:**

After completion of this unit, students will be able to

- Demonstrate a clear understanding of CMOS fabrication flow and technology scaling (L2)
- Analyze the electrical properties of MOS and BiCMOS circuits (L3)
- Design MOSFET based logic circuit (L4)

**UNIT – II**

**VLSI Circuit Design Processes:** VLSI Design Flow, MOS Layers, Stick Diagrams, Design Rules and Layouts, Lambda based design rules, Contact cuts, CMOS Lambda based design rules, Layout Diagrams for logic gates, Transistor structures, wires and vias, Scaling of MOS circuits- Scaling models, scaling factors, scaling factors for device parameters, Limitations of Scaling.

**Learning Outcomes:**

After completion of this unit, students will be able to

- Understand the design rules and layout diagram for logic gates, limitations of scaling (L1)
- Draw the Layout of simple MOS circuit using Lambda based design rules (L2)

### UNIT – III

**Gate Level Design and Layout:** Architectural issues, Switch logic networks: Gate logic, Alternate gate circuit: Pseudo-NMOS Dynamic CMOS logic. Basic circuit concepts, Sheet Resistance  $R_s$  and its concept to MOS, Area Capacitance Units, Calculations, The delay unit  $T$ , Inverter Delays, Driving large Capacitive Loads, Wiring Capacitances, Fan-in and fan-out, Choice of layers

#### Learning Outcomes:

After completion of this unit, students will be able to

- Apply basic circuit concepts to MOS circuits. (L2)
- Estimate the propagation delays in CMOS circuits (L3).

### UNIT – IV

**Subsystem Design:** Subsystem Design, Shifters, Adders, ALUs, Multipliers: Array multiplier, Serial/Parallel multiplier, Parity generator, Comparators, Zero/One Detectors, Up/Down Counter, Memory elements: SRAM, DRAM, ROM, Serial Access Memories.

#### Learning Outcomes:

After completion of this unit, students will be able to

- Apply the Lambda based design rules for subsystem design (L2)
- Design of Adders, Multipliers and memories etc (L4)
- Design digital systems using MOS circuits (L4)

### UNIT – V

**Semiconductor Integrated Circuit Design:** PLDs, FPGAs, CPLDs, Standard Cells, Programmable Array Logic, Programmable Logic Array Design Approach.

#### Learning Outcomes:

After completion of this unit, students will be able to

- Analyze various architectures and device technologies of PLDs (L3)
- Design simple logic circuit using PLA, PAL, FPGA and CPLD. (L4)

#### Course Outcomes:

- Learn the basic fabrication process of MOS transistors, study CMOS inverter circuits, basic circuit concepts such as Sheet Resistance, Area Capacitance and Delay calculation,

Field programmable gate arrays and realization techniques, CPLDs and FPGAs for implementing the various logic functions.

- Apply CMOS technology-specific layout rules in the placement and routing of transistors and interconnect, and to verify the functionality.
- Analyze the performance of CMOS Inverter circuits
- Compare various Scaling models and understand the effect of scaling on device parameters

#### **TEXT BOOKS:**

1. Kamran Eshraghian, “Essentials of VLSI circuits and systems”, EshraghianDouglasand A. Pucknell, PHI, 2005 Edition
2. Wayne Wolf, “Modern VLSI Design”, 3rd Edition, Pearson Education, 1997.

#### **REFERENCE BOOKS:**

1. John .P. Uyemura, “CMOS logic circuit Design”, Springer, 2007.
2. Neil H. E Weste, “CMOS VLSI Design – A Circuits and Systems Perspective”, 3<sup>rd</sup> edition, DavidHarris, Ayan Banerjee, Pearson, 2009.

**Course Objectives:**

- To understand the concept of various modulation schemes and multiplexing.
- To apply the concept of various modulation schemes to solve engineering problems.
- To analyse various modulation schemes.
- To evaluate various modulation scheme in real time applications.

**UNIT-I:**

**Amplitude Modulation**

Introduction to Noise and Fourier Transform. An overview of Electronic Communication Systems. Need for Frequency Translation, Amplitude Modulation: DSB-FC, DSB-SC, SSB-SC and VSB. Frequency Division Multiplexing. Radio Transmitter and Receiver.

**Learning Outcomes:**

At the end of the unit, the student should be able to

- Understand the concept of noise, Fourier transform, carrier modulation and frequency division multiplexing (L1).
- Apply the concept of amplitude modulation to solve engineering problems (L2).
- Analyse various amplitude modulation schemes (L3).
- Evaluate various amplitude modulation schemes in real time applications (L3).

**UNIT-II:**

**Angle Modulation**

Angle Modulation, Tone modulated FM Signal, Arbitrary Modulated FM Signal, FM Modulation and Demodulation. Stereophonic FM Broadcasting.

**Learning Outcomes:**

At the end of the unit, the student should be able to

- Understand the concept of angle modulation and its components (L1).
- Apply the concept of frequency modulation to solve engineering problems (L2).
- Analyse angle modulation schemes (L3).
- Evaluate frequency modulation scheme in real time applications (L3).

### **UNIT-III:**

#### **Pulse Modulation**

Sampling Theorem: Low pass and Band pass Signals. Pulse Amplitude Modulation and Concept of Time Division Multiplexing. Pulse Width Modulation. Digital Representation of Analog Signals.

#### **Learning Outcomes:**

At the end of the unit, the student should be able to

- Understand the concept of various pulse modulation schemes and time division multiplexing (L1).
- Analyse various pulse modulation schemes (L3).

### **UNIT-IV:**

#### **Digital Modulation**

Binary Amplitude Shift Keying, Binary Phase Shift Keying and QuadraturePhase Shift Keying, Binary Frequency Shift Keying. Regenerative Repeater.

#### **Learning Outcomes:**

At the end of the unit, the student should be able to

- Understand the concept of various digital modulation schemes (L1).
- Analyze various digital modulation schemes (L3).

### **UNIT-V:**

#### **Communication Systems**

Satellite, RADAR, Optical, Mobile and Computer Communication (Block diagram approach only).

#### **Learning Outcomes:**

At the end of the unit, the student should be able to

- Understand the concept of various communication systems (L1).

Note: The main emphasis is on qualitative treatment. Complex mathematical treatment may be avoided.

#### **Course Outcomes:**

- Understand the concept of various modulation schemes and multiplexing (L1).
- Apply the concept of various modulation schemes to solve engineering problems (L2).
- Analyse various modulation schemes, and evaluate various modulation scheme in real time applications (L3).

**TEXT BOOKS:**

1. Herbert Taub, Donald L Schilling and Goutam Saha, “Principles of Communication Systems”, 3<sup>rd</sup>Edition, Tata McGraw-Hill Publishing Company Ltd., 2008.

**REFERENCES:**

1. B. P. Lathi, Zhi Ding and Hari M. Gupta, “Modern Digital and Analog Communication Systems”, 4<sup>th</sup> Edition, Oxford University Press, 2017.
2. K. Sam Shanmugam “Digital and Analog Communication Systems”, Wiley India Edition, 2008.

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**Blooms’ Learning levels:**

L1: Remembering and Understanding

L2: Applying

L3: Analyzing, Evaluating



**(19A27604a) FOOD TOXICOLOGY**  
**OPEN ELECTIVE II**

**PREAMBLE**

This text covers about toxins and their relation in food. Examination, identification and prevention of toxins.

**Course Objectives**

- To know the various toxins and their evaluation.
- To understand their tolerance and control measures.

**UNIT – I**

Principles of Toxicology: classification of toxic agents; characteristics of exposure; spectrum of undesirable effects; interaction and tolerance; biotransformation and mechanisms of toxicity. Evaluation of toxicity: risk vs. benefit: experimental design and evaluation: prospective and retrospective studies: Controls :Statistics (descriptive, inferential): animal models as predictors of human toxicity: Legal requirements and specific screening methods: LD50 and TD50: in vitro and in vitro studies; clinical trials.

**Learning Outcomes:**

At the end of unit, students will be able to understand the following

- Classification of toxic agents; characteristics of exposure;
- Spectrum of undesirable effects; interaction and tolerance; biotransformation and mechanisms of toxicity.
- Evaluation of toxicity: risk vs. benefit: experimental design and evaluation:
- Prospective and retrospective studies: Controls: Statistics (descriptive, inferential): animal models as predictors of human toxicity:
- Legal requirements and specific screening methods: LD50 and TD50: in vitro and in vitro studies; clinical trials.

**UNIT – II**

Natural toxins in food: natural toxins of importance in food- toxins of plant and animal origin; microbial toxins (e.g., bacterial toxins, fungal toxins and Algal toxins), natural occurrence, toxicity and significance, determination of toxicants in foods and their management.

**Learning Outcomes:**

At the end of unit, students will be able to understand the following

- Natural toxins in food: natural toxins of importance in food- toxins of plant and animal origin
- Microbial toxins (e.g., bacterial toxins, fungal toxins and algal toxins), natural occurrence, toxicity and significance
- Determination of toxicants in foods and their management

### **UNIT – III**

Food allergies and sensitivities: natural sources and chemistry of food allergens; true/untrue food allergies; handling of food allergies; food sensitivities (anaphylactoid reactions, metabolic food disorders and idiosyncratic reactions); Safety of genetically modified food: potential toxicity and allergenicity of GM foods. Safety of children consumables.

#### **Learning outcomes:**

At the end of unit, students will be able to understand the following

- Natural sources and chemistry of food allergens; true/untrue food allergies; handling of food allergies
- Food sensitivities (anaphylactoid reactions, metabolic food disorders and idiosyncratic reactions)
- Potential toxicity and allergenicity of gm foods. Safety of children consumables.

### **UNIT – IV**

Environmental contaminants and drug residues in food: fungicide and pesticide residues in foods; heavy metal and their health impacts; use of veterinary drugs (e.g. Malachite green in fish and  $\beta$ - agonists in pork); other contaminants in food, radioactive contamination of food, Food adulteration and potential toxicity of food adulterants.

#### **Learning Outcomes:**

At the end of unit, students will be able to understand the following

- Fungicide and pesticide residues in foods; heavy metal and their health impacts
- Use of veterinary drugs (e.g. Malachite green in fish and  $\beta$ - agonists in pork); other contaminants in food, radioactive contamination of food
- Food adulteration and potential toxicity of food adulterants.

### **UNIT – V**

Food additives and toxicants added or formed during food processing: safety of food additives; toxicological evaluation of food additives; food processing generated toxicants: nitroso-compounds, heterocyclic amines, dietary Supplements and toxicity related to dose: common dietary supplements; relevance of the dose; possible toxic effects.

## **Learning Outcomes:**

At the end of unit, students will be able to understand the following

- Safety of food additives; toxicological evaluation of food additives;
- Nitroso-compounds, heterocyclic amines, dietary supplements and toxicity related to dose
- Common dietary supplements; relevance of the dose; possible toxic effects.

## **Course Outcomes**

By the end of course

- Student will gain knowledge on principles of toxicity and characteristics of toxins and their classification. Examination and prevention of toxins in foods and etc.

## **TEXT BOOKS**

1. Helferich, W., and Winter, C.K “Food Toxicology”,. CRC Press, LLC. Boca Raton, FL. 2007.
2. Shibamoto, T., and Bjeldanes, L. “Introduction to Food Toxicology”, 2009, 2<sup>nd</sup> Edition. Elsevier Inc., Burlington, MA.
3. Watson, D.H. “Natural Toxicants in Food”, CRC Press, LLC. Boca Raton, FL1998.

## **REFERENCES**

1. Duffus, J.H., and Worth, H.G. J. “Fundamental Toxicology”, The Royal Society of Chemistry. 2006.
2. Stine, K.E., and Brown, T.M. “Principles of Toxicology”, 2<sup>nd</sup> Edition. CRC Press. 2006.
3. Tönu, P. “Principles of Food Toxicology”. CRC Press, LLC. Boca Raton, FL. 2007.

**(19A27604b) FOOD PLANT EQUIPMENT DESIGN**  
**OPEN ELECTIVE - II**

**PREAMBLE**

This text focuses on materials used for food plant equipment and factors considered for design of various equipment.

**Course Objectives:**

- To understand the material properties and codes used.
- To know the design considerations.
- To study the design of evaporators, dryers, crystallizers and etc.

**UNIT – I**

Materials and properties: Materials for fabrication, mechanical properties, ductility, hardness, corrosion, protective coatings, corrosion prevention linings equipment, choice of materials, material codes. Design considerations: Stresses created due to static and dynamic loads, combined stresses, design stresses and theories of failure, safety factor, temperature effects, radiation effects, effects of fabrication method, economic considerations

**Learning Outcomes:**

At the end of unit, students will be able to understand the following

- Materials for fabrication, mechanical properties, ductility, hardness, corrosion, protective coatings
- Corrosion prevention linings equipment, choice of materials, material codes
- Stresses created due to static and dynamic loads, combined stresses, design stresses and theories of failure, safety factor
- Temperature effects, radiation effects, effects of fabrication method, economic considerations

**UNIT – II**

Design of pressure and storage vessels: Operating conditions, design conditions and stress; Design of shell and its component, stresses from local load and thermal gradient, mountings and accessories. Design of heat exchangers: Design of shell and tube heat exchanger, plate heat exchanger, scraped surface heat exchanger, sterilizer and retort

**Learning Outcomes:**

At the end of unit, students will be able to understand the following

- Design of pressure and storage vessels includes operating conditions, design conditions and stress
- Design of shell and its component, stresses from local load and thermal gradient, mountings and accessories
- Design of heat exchangers like shell and tube heat exchanger, plate heat exchanger, scraped surface heat exchanger, sterilizer and retort

### **UNIT – III**

Design of evaporators and crystallizers: Design of single effect and multiple effect evaporators and its components; Design of rising film and falling film evaporators and feeding arrangements for evaporators; Design of crystallizer and entrainment separator

#### **Learning Outcomes:**

At the end of unit, students will be able to understand the following

- Design of evaporators like single effect and multiple effect evaporators and its components; rising film and falling film evaporators and feeding arrangements for evaporators;
- Design of crystallizer and entrainment separator

### **UNIT – IV**

Design of agitators and separators: Design of agitators and baffles; Design of agitation system components and drive for agitation. Design of centrifuge separator; Design of equipment components, design of shafts, pulleys, bearings, belts, springs, drives, speed reduction systems. Design of freezing equipment: Design of ice-ream freezers and refrigerated display system

#### **Learning Outcomes:**

At the end of unit, students will be able to understand the following

- Design of agitators and baffles like Design of agitation system components and drive for agitation.
- Design of centrifuge separator like equipment components, design of shafts, pulleys, bearings, belts, springs, drives, speed reduction systems.
- Design of freezing equipment like ice-ream freezers and refrigerated display system

### **UNIT – V**

Design of dryers: Design of tray dryer, tunnel dryer, fluidized dryer, spray dryer, vacuum dryer, freeze dryer and microwave dryer. Design of extruders: Cold and hot extruder design, design of screw and barrel, design of twin screw extruder. Design of fermenters: Design of fermenter vessel, design problems

#### **Learning Outcomes:**

At the end of unit, students will be able to understand the following

- Design of dryers like tray dryer, tunnel dryer, fluidized dryer, spray dryer, vacuum dryer, freeze dryer and microwave dryer
- Design of extruders like Cold and hot extruder design, design of screw and barrel, design of twin screw extruder.
- Design of fermenter vessel, design problems

### **Course Outcomes**

By the end of the course, the students will

- acquires knowledge on theoretical aspects to be design considerations for a food plant equipment and designing of evaporators, separators, storage vessels and etc.

### **TEXT BOOKS**

1. Antonio Lopez-Gomez, Gustavo V. Barbosa-Canovas, “Food plant design”, CRC press 2005.
2. George D. Saravacos and Zacharias B. Maroulis, “Food Plant Economics”, CRC Press 2007.

### **REFERENCES**

1. Peters M., Timmerhaus K. & Ronald W., “Plant Design & Economics for Chemical Engineers”, McGraw Hill.
2. James R Couper, “Process Engg. Economics (Chemical Industries) CRC Press 3. Aries & Newton, Chemical Engg. Cost Estimation”, McGraw Hill.

**(19A54604a) WAVELET TRANSFORMS AND ITS APPLICATIONS**

**OPEN ELECTIVE-II**

**Course Objective:**

This course provides the students to understand Wavelet transforms and its applications.

**UNIT-I-**

**Wavelets**

Wavelets and Wavelet Expansion Systems - Wavelet Expansion- Wavelet Transform- Wavelet System- More Specific Characteristics of Wavelet Systems -Haar Scaling Functions and Wavelets -effectiveness of Wavelet Analysis -The Discrete Wavelet Transform The Discrete-Time and Continuous Wavelet Transforms.

**Learning Outcomes:**

Students will be able to

- Understand wavelets and wavelet expansion systems.
- Find wavelet transforms in continuous as well as discrete domains.

**UNIT-II-**

**A Multiresolution Formulation of Wavelet Systems**

Signal Spaces -The Scaling Function -Multiresolution Analysis - The Wavelet Functions - The Discrete Wavelet Transform- A Parseval's Theorem - Display of the Discrete Wavelet Transform and the Wavelet Expansion.

**Learning Outcomes:**

Students will be able to

- Illustrate the multi resolution analysis, scaling function.
- Implement parseval theorem.

**UNIT-III-**

**Filter Banks and the Discrete Wavelet Transform :** Analysis - From Fine Scale to Coarse Scale- Filtering and Down-Sampling or Decimating -Synthesis - From Coarse Scale to Fine Scale -Filtering and Up-Sampling or Stretching - Input Coefficients - Lattices and Lifting - - Different Points of View.

**Learning Outcomes:**

Students will be able to

- Form fine scale to coarse scale analysis.

- Perform decimating synthesis.
- Find the lattices and lifting.

#### **UNIT-IV**

Multiresolution versus Time-Frequency Analysis- Periodic versus Nonperiodic Discrete Wavelet Transforms -The Discrete Wavelet Transform versus the Discrete-Time Wavelet Transform- Numerical Complexity of the Discrete Wavelet Transform.

#### **Learning Outcomes:**

Students will be able to

- Perform multi resolution versus time frequency analysis.
- Perform numerical complexity of discrete wavelet transforms.

#### **UNIT-V**

Bases, Orthogonal Bases, and Biorthogonal Bases -Matrix Examples - Fourier Series Example - Sine Expansion Example - Frames and Tight Frames - Matrix Examples -Sine Expansion as a Tight Frame Example.

#### **Learning Outcomes:**

Students will be able to

- Understand the orthogonal bases and Biorthogonal Bases.
- Find the Frames and Tight Frames using Fourier series.

#### **Course Outcomes:**

After the completion of course, students will be able to

- Understand wavelets and wavelet expansion systems.
- Illustrate the multi resolution analysis and scaling functions.
- Form fine scale to coarse scale analysis.
- Find the lattices and lifting.
- Perform numerical complexity of discrete wavelet transforms.
- Find the frames and tight frames using fourier series.

#### **TEXT BOOKS:**

1. C. Sidney Burrus, Ramesh A. Gopinath, "Introduction to Wavelets and Wavelets Transforms", Prentice Hall, (1997).
2. James S. Walker, "A Primer on Wavelets and their Scientific Applications", CRC Press, (1999).

#### **REFERENCE BOOKS:**

1. Raghuvver Rao, "Wavelet Transforms", Pearson Education, Asia.



**(19A52604a) SOFT SKILLS**  
**(OPEN ELECTIVE-II)**

**Course Objectives**

- To develop awareness in students of the relevance and importance of soft skills
- To provide students with interactive practice sessions to make them internalize soft skills
- To develop Time management, Positive thinking & Decision making skills
- To enable to manage stress effectively
- To enable them to develop employability skills

**SYLLABUS**

**UNIT – I**

**INTRODUCTION**

Definition – Scope – Importance- – Methods of improving soft skills – Limits- Analysis – Interpersonal and intrapersonal skills - Verbal and Non-verbal skills.

**Learning Outcomes:**

At the end of the module, the learners will be able to

- Understand the importance of soft skills
- Identify the methods of improving soft skills
- Analyze various soft skills in different situations
- Distinguish various soft skills
- Apply various soft skills in day to day life and in workplace

**UNIT – II INTRAPERSONAL SKILLS**

Knowing self/temperaments/traits - Johari windows – quotient skills(IQ, EQ, SQ), creativity, decision-making-Attitude – Confidence Building - Positive Thinking –Time Management – Goal setting.

**Learning Outcomes:**

At the end of the module, the learners will be able to

- Understand self and its temperament.
- Apply various techniques to know the self.
- Develop positive thinking
- Develop creative thinking and decision-making skills

- Apply self-knowing tools in day to day and professional life.

## **UNIT – III**

### **INTERPERSONAL SKILLS**

Leadership Skills – Negotiation skills – Team-building – Crisis Management – Event Management – Ethics and Etiquettes.

#### **Learning Outcomes:**

At the end of the module, the learners will be able to

- Understand the importance of interpersonal skills
- Analyze various tactics in negotiation skills.
- Develop team building spirit.
- Develop crisis management
- Apply interpersonal skills through etiquettes.

## **UNIT – IV**

### **VERBAL SKILLS**

Importance of verbal skills in corporate climate, Listening skills –Mother Tongue Influence (MTI) - Speaking skills – Public speaking - Oral presentations - Writing skills –E-mail etiquettes – Memos - Indianism

#### **Learning Outcomes:**

At the end of the module, the learners will be able to

- Understand the importance of verbal skills in corporate climate.
- Explain the need of listening skills.
- Explore MTI and suggest remedies to avoid it.
- Interpret various contexts of speaking.
- Apply verbal skills in personal and professional life.

## **UNIT – V NON-VERBAL SKILLS**

Importance of body language in corporate culture – body language-Facial expressions – eye contact – posture – gestures – Proxemics – Haptics – Dress Code – Paralanguage –Tone, pitch, pause& selection of words

#### **Learning Outcomes:**

At the end of the module, the learners will be able to

- Comprehend the importance of non-verbal communication.
- Expound the need of facial expressions, postures and gestures.
- Analyze proxemics, haptics etc.
- Understand the importance of dress code.
- Apply various techniques to use para language

### **Course Outcomes**

- Recognize the importance of verbal and non verbal skills
- Develop the interpersonal and intrapersonal skills
- Apply the knowledge in setting the SMART goals and achieve the set goals
- Analyze difficult situations and solve the problems in stress-free environment
- Create trust among people and develop employability skills

### **Text Books**

1. Meenakshi Raman & Shalini Upadhyay “ Soft Skills”, Cengage Learning, 2018.
2. S. Balasubramaniam, “Soft Skills for Interpersonal Communication”, Orient Black Swan, 2017.

### **References**

1. Barun K. Mitra, “Personality Development and Soft Skills”, –OXFORD Higher Education 2018.
2. Alka Wadkar, “Life Skills for Success “, Sage Publications 2016.
3. Robert M Sheffield, “Developing Soft Skills”, Pearson, 2010.
4. Diana Booher, “Communicate With Confidence”, Tata McGrawhill, 2012.

**(19A51604a) CHEMISTRY OF POLYMERS AND ITS APPLICATIONS**

**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**

Basic concepts: monomers, repeat units, degree of polymerization, linear, branched and network polymers, classification of polymers, Polymerization: condensation, addition, radical chain, ionic and coordination and copolymerization. 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.

**Learning Outcomes:**

At the end of this unit, the students 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**

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 of Polymers based on different types of monomers, Olefin polymers, Diene polymers, nylons, Urea - formaldehyde, phenol - formaldehyde and melamine Epoxy and Ion exchange resins. Characterization of polymers by IR, NMR, XRD.

**Learning Outcomes:**

At the end of this unit, the students will be able to

- Differentiate Bulk, solution, Suspension and emulsion polymerization (L2)

- Describe fibers and elastomers (L2)
- Identify the thermosetting and thermo polymers (L3)
- Characterize the properties of polymers by IR, NMR, XRD etc.,

### **Unit – III : Natural Polymers & Modified cellulotics**

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 cellulotics: Cellulose esters and ethers such as Ethyl cellulose, CMC, HPMC, cellulose acetals, Liquid crystalline polymers; specialty plastics- PES, PAES, PEEK, PEAK.

#### **Learning Outcomes:**

At the end of this unit, the students 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 cellulotics (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 students 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 electrokinetics, micelles, reverse micelles, solubilization. Application of photoelectron spectroscopy, ESCA and Auger spectroscopy to the study of surfaces.

## Learning Outcomes:

At the end of this unit, the students will be able to

- Demonstrate electrical phenomena at interfaces including electrokinetics, micelles, reverse micelles etc., (L2)
- Explain photoelectron spectroscopy (L2)
- Discuss ESCA and Auger spectroscopy to the study of surfaces (L3)
- Differentiate micelles and reverse micelles (L2)

## Course Outcomes

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

- Understand the state of art synthesis of Polymeric materials
- Understand the hydro gels preparation, properties and applications in drug delivery system.
- Characterize polymers materials using IR, NMR, XRD.
- Analyze surface phenomenon fo micelles and characterise using photoelectron spectroscopy, ESCA and Auger spectroscopy.

## 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 – Gowarikar
6. Physical Chemistry –Galston
7. Drug Delivery- Ashim K. Misra

**HUMANITIES ELECTIVE-I**

**(19A52602a) ENTREPRENEURSHIP & INCUBATION**

**COURSE OBJECTIVES :**

The objective of this course is

- To make the student understand about Entrepreneurship
- To enable the student in knowing various sources of generating new ideas in setting up of New enterprise
- To facilitate the student in knowing various sources of finance in starting up of a business
- To impart knowledge about various government sources which provide financial assistance to entrepreneurs/ women entrepreneurs
- To encourage the student in creating and designing business plans

**Syllabus**

**UNIT-I**

Entrepreneurship - Concept, knowledge and skills requirement - Characteristics of successful entrepreneurs - Entrepreneurship process - Factors impacting emergence of entrepreneurship - Differences between Entrepreneur and Intrapreneur - Understanding individual entrepreneurial mindset and personality - Recent trends in Entrepreneurship.

**Learning Outcomes:**

At the end of the Unit, the learners will be able to

- Understand the concept of Entrepreneur and Entrepreneurship in India
- Know Entrepreneurship process and emergence of Entrepreneurship
- Analyze the differences between Entrepreneur and Intrapreneur
- Develop a creative mind set and personality
- Understand recent trends in Entrepreneurship across the globe

**UNIT-II**

Starting the New Venture - Generating business idea – Sources of new ideas & methods of generating ideas - Opportunity recognition - Feasibility study - Market feasibility, technical/operational feasibility - Financial feasibility - Drawing business plan - Preparing project report - Presenting business plan to investors.

## **Learning Outcomes:**

At the end of the Unit, the learners will be able to

- Know the process of starting a new venture
- Analyze the sources of new methods in generating business idea
- Evaluate market feasibility, financial feasibility and technical feasibility
- Design and draw business plans in project preparation and prepare project reports

## **UNIT-III**

Sources of finance - Various sources of Finance available - Long term sources - Short term sources - Institutional Finance – Commercial Banks, SFC's in India - NBFC's in India - their way of financing in India for small and medium business - Entrepreneurship development programs in India - The entrepreneurial journey- Institutions in aid of entrepreneurship development

## **Learning Outcomes:**

At the end of the Unit, the learners will be able to

- Know the various sources of finance to start a new venture
- Contrast & compare between Long term & Short term finance sources
- Analyze the role of banks and other financial institutions in promoting entrepreneurship in India
- Evaluate the need and importance of MSMEs in the growth of country

## **UNIT-IV**

Women Entrepreneurship - Entrepreneurship Development and Government - Role of Central Government and State Government in promoting women Entrepreneurship - Introduction to various incentives, subsidies and grants – Export- oriented Units - Fiscal and Tax concessions available - Women entrepreneurship - Role and importance - Growth of women entrepreneurship in India - Issues & Challenges - Entrepreneurial motivations.

## **Learning Outcomes:**

At the end of the Unit, the learners will be able to

- Understand the role of government in promoting women entrepreneurship
- Know various incentives, subsidies and grants available to women entrepreneurs
- Analyze the role of export-oriented units
- Know about the tax concessions available for Women entrepreneurs
- Prepare to face the issues and challenges.

## **UNIT-V**



Fundamentals of Business Incubation - Principles and good practices of business incubation- Process of business incubation and the business incubator and how they operate and influence the Type/benefits of incubators - Corporate/educational / institutional incubators - Broader business incubation environment - Pre-Incubation and Post - Incubation process - Idea lab, Business plan structure - Value proposition

### **Learning Outcomes:**

At the end of the Unit, the learners will be able to:

- Understand the importance of business incubation
- Apply brilliant ideas in the process of business incubation
- Analyze the process of business incubation/incubators.
- Contrast & Compare between business incubation and business incubators.
- Design their own business incubation/incubators as viable-business unit.

### **Course Outcomes:**

At the end of the course, students will be able to

- Understand the concept of Entrepreneurship and challenges in the world of competition.
- Apply the Knowledge in generating ideas for New Ventures.
- Analyze various sources of finance and subsidies to entrepreneur/women Entrepreneurs.
- Evaluate the role of central government and state government in promoting Entrepreneurship.
- Create and design business plan structure through incubations.

### **TEXT BOOKS**

1. D F Kuratko and T V Rao, “Entrepreneurship” - A South-Asian Perspective – Cengage Learning, 2012. (For PPT, Case Solutions Faculty may visit : [login.cengage.com](http://login.cengage.com))
- 2 . Nandan H, “ Fundamentals of Entrepreneurship”, PHI, 2013

### **REFERENCES**

1. Vasant Desai, “Small Scale Industries and Entrepreneurship”, Himalaya Publishing 2012.
2. Rajeev Roy “Entrepreneurship”, 2<sup>nd</sup> Edition, Oxford, 2012.
3. B.Janakiramand M.Rizwanal “Entrepreneurship Development: Text & Cases”, Excel Books, 2011.
4. Stuart Read, Effectual “Entrepreneurship”, Routledge, 2013.

### **E-RESOURCES**

1. Entrepreneurship-Through-the-Lens-of-enture Capital

2. <http://www.onlinevideolecture.com/?course=mba-programs&subject=entrepreneurship>
3. [http://nptel.ac.in/courses/122106032/Pdf/7\\_4.pdf](http://nptel.ac.in/courses/122106032/Pdf/7_4.pdf)
4. <http://freevideolectures.com/Course/3514/Economics-/-Management-/-Entrepreneurhip/50>

**Course Objectives :**

The objective of this course is

- 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
- To know the various types of Market Structures & pricing methods and its strategies
- To give an overview on investment appraisal methods to promote the students to learn how to plan long-term investment decisions.
- To provide fundamental skills on Accounting and to explain the process of preparing Financial statements

**Syllabus**

**UNIT I -**

**INTRODUCTION TO MANAGERIAL ECONOMICS DEMAND**

Managerial Economics – Definition – Nature & Scope - Contemporary importance of Managerial Economics - Demand Analysis - Concept of Demand - Demand Function - Law of Demand - Elasticity of Demand - Significance - Types of Elasticity - Measurement of Elasticity of Demand - Demand Forecasting - Factors governing Demand Forecasting - Methods of Demand Forecasting - Relationship of Managerial Economics with Financial Accounting and Management.

**Learning Outcomes:**

At the end of the Unit, the learners will be able to

- Know the nature and scope of Managerial Economics and its importance
- Understand the concept of demand and its determinants
- Analyze the Elasticity and degree of elasticity
- Evaluate Demand forecasting methods
- Design the process of demand estimation for different types of demand

**UNIT -II**

**THEORY OF PRODUCTION AND COST ANALYSIS**

**Production Function** – Least-cost combination - Short-run and Long-run Production Function - Isoquants and Isocosts, MRTS - Cobb-Douglas Production Function - Laws of Returns -

Internal and External Economies of scale – **Cost & Break Even Analysis** - Cost concepts and Cost behavior - Break-Even Analysis (BEA) - Determination of Break-Even Point (Simple Problems) - Managerial significance and limitations of Break-Even Analysis.

### **Learning Outcomes:**

At the end of the Unit, the learners will be able to

- Know the production function, Input-Output relationship and different cost concepts
- Apply the least-cost combination of inputs
- Analyze the behavior of various cost concepts
- Evaluate BEA for real time business decisions
- Develop profit appropriation for different levels of business activity

## **UNIT –III**

### **INTRODUCTION TO FORMS OF BUSINESS ORGANIZATIONS AND MARKETS**

**Market structures** - Forms of Business Organizations - Sole Proprietorship - Partnership - Joint Stock Companies - Public Sector Enterprises-Types of Markets - Perfect and Imperfect Competition - Features of Perfect Competition – Monopoly - Monopolistic Competition – Oligopoly - Price-Output Determination - Pricing Methods and Strategies.

### **Learning Outcomes:**

At the end of the Unit, the learners will be able to

- Know the structure of markets, features of different markets and forms of business organizations
- Apply the price output relationship in different markets
- Analyze the optimum output levels to maximize profit in different markets
- Evaluate price-output relationship to optimize cost, revenue and profit
- Interpret Pricing Methods and Strategies

## **UNIT -IV**

**CAPITAL AND CAPITAL BUDGETING** Concept of Capital - Significance - Types of Capital - Components of Working Capital - Sources of Short-term and Long-term Capital - Estimating Working capital requirements – Cash Budget - **Capital Budgeting** – Features of Capital Budgeting Proposals – Methods and Evaluation of Capital Budgeting Projects – Pay Back Method – Accounting Rate of Return (ARR) – Net Present Value (NPV) – Internal Rate Return (IRR) Method (simple problems)

### **Learning Outcomes:**

At the end of the Unit, the learners will be able to

- Know the concept of capital budgeting and its importance in business
- Contrast and compare different investment appraisal methods
- Analyze the process of selection of investment alternatives using different appraisal methods

- Evaluate methods of capital budgeting for investment decision making and for maximizing returns
- Design different investment appraisals and make wise investments

## UNIT –V

### INTRODUCTION TO FINANCIAL ACCOUNTING AND ANALYSIS

Accounting Concepts and Conventions - Introduction Double-Entry Book Keeping, Journal, Ledger, Trial Balance - Final Accounts (Trading Account, Profit and Loss Account and Balance Sheet with simple adjustments). *Financial Analysis* - Analysis and Interpretation of Liquidity Ratios, Activity Ratios, and Capital structure Ratios and Profitability.

#### Learning Outcomes:

At the end of the Unit, the learners will be able to

- Know the concept, convention and significance of accounting
- Apply the fundamental knowledge of accounting while posting the journal entries
- Analyze the process and preparation of final accounts and financial ratios
- Evaluate the financial performance of an enterprise by using financial statements

#### Data Books Required:

Present Value Factors table

#### Course Outcomes:

At the end of the course, students will be able to

- Understand the fundamentals of Economics viz., Demand, Production, cost, revenue and markets
- Apply concepts of production, cost and revenues for effective business decisions
- Students can analyze how to invest their capital and maximize returns
- Evaluate the capital budgeting techniques
- Prepare the accounting statements and evaluate the financial performance of business entity.

#### TEXT BOOKS:

1. Varshney & Maheswari: “Managerial Economics”, Sultan Chand, 2013.
2. Aryasri: “Business Economics and Financial Analysis”, 4<sup>th</sup> edition, MGH, 2019

#### REFERENCES:

1. Ahuja Hl “Managerial economics” 3<sup>rd</sup> edition, Schand, ,2013
2. S.A. Siddiqui and A.S. Siddiqui: “Managerial Economics and Financial Analysis”, New Age International,. 2013.

3. Joseph G. Nellis and David Parker: "Principles of Business Economics", 2<sup>nd</sup> edition, Pearson, New Delhi.
4. Domnick Salvatore: "Managerial Economics in a Global Economy", Cengage, 2013.

**Course Objectives :**

The objectives of this course are

- To make the student understand the principles of business ethics
- To enable them in knowing the ethics in management
- To facilitate the student role in corporate culture
- Impart knowledge about the fair trade practices
- Encourage the student in knowing them about the corporate governance

**Syllabus**

**BUSINESS ETHICS AND CORPORATE GOVERNANCE**

**UNIT -I**

**Introduction** – Meaning - Nature and Scope – Loyalty and Ethical Behaviour, Values across Cultures; Business Ethics – Ethical Practices in Management. Types of Ethics – Characteristics – Factors influencing , Business Ethics – Importance of Business Ethics - Arguments for and against business ethics Basics of business ethics Corporate Social Responsibility – Issues of Management – Crisis Management

**Learning Outcomes:**

After completion of this unit student will

- Understand the meaning of loyalty and ethical Behavior
- Explain various types of Ethics
- Know about the factors influencing business ethics
- Understand the corporate social responsibility of management

**UNIT –II**

**ETHICS IN MANAGEMENT**

Introduction – Ethics in HRM – Marketing Ethics – Ethical aspects of Financial Management- Technology Ethics and Professional ethics. The Ethical Value System – Universalism, Utilitarianism, Distributive Justice, Social Contracts, Individual Freedom of Choice, Professional Codes; Culture and Ethics – Ethical Values in different Cultures, Culture and Individual Ethics.

**Learning Outcomes:**

After completion of this unit student will

- Understand the meaning of Marketing Ethics
- Analyze Differentiate between Technical ethics and professional ethics
- Know about the ethical value system
- Understand the Code and culture

### **UNIT-III**

#### **ROLE OF CORPORATE CULTURE IN BUSINESS**

Meaning – Functions – Impact of corporate culture – cross cultural issues in ethics, Emotional Honesty – Value of humility – Promote happiness – karma yoga – proactive – flexibility and purity of mind. The Ethical Value System – Universalism, Utilitarianism, Distributive Justice, Social Contracts, Individual Freedom of Choice, Professional Codes; Culture and Ethics – Ethical Values in different Cultures, Culture and Individual Ethics.

#### **Learning Outcomes:**

After completion of this unit student will

- Understand the corporate culture in business
- Analyze Ethical Value System Know about the ethical value system
- Know Universalism, Utilitarianism, Distributive Justice
- Differentiate Ethical Values in different Cultures

### **UNIT- IV**

Law and Ethics – Relationship between Law and Ethics, Other Bodies in enforcing Ethical Business Behavior, Impact of Laws on Business Ethics; Social Responsibilities of Business – Environmental Protection, Fair Trade Practices, Fulfilling all National obligations under various Laws, Safeguarding Health and wellbeing of Customers.

#### **Learning Outcomes:**

After completion of this unit student will

- Understand Law and Ethics
- Analyze Social Responsibilities of Business
- Know Environmental Protection and Fair Trade Practices
- Implementing National Safeguarding Health and wellbeing of Customers

### **UNIT –V**

#### **CORPORATE GOVERNANCE**

Meaning – scope - Issues, need, corporate governance code, transparency & disclosure, role of auditors, board of directors and shareholders; Global issues of governance, accounting and regulatory frame work, corporate scams, committees in India and abroad, corporate social responsibility composition of BODs - Cadbury Committee - various committees - reports on corporate governance - Benefits and Limitations of Corporate Governance with living examples.



## **Learning Outcomes:**

After completion of this unit student will

- Understand corporate governance code
- Analyze role of auditors, board of directors and shareholders
- Know accounting and regulatory frame work
- Implementing corporate social responsibility

## **Course Outcomes:**

At the end of the course, students will be able to

- Understand business ethics and ethical practices in management.
- Understand the role of ethics in management
- Apply the knowledge in cross cultural ethics
- Analyze law and ethics
- Evaluate corporate governance

## **TEXT BOOKS:**

1. Murthy CSV: “Business Ethics and Corporate Governance”, HPH
2. Bholanath Dutta, S.K. Podder – “Corporation Governance”, VBH.

## **REFERENCE BOOKS:**

1. Dr. K. Nirmala, KarunakaraReaddy : “Business Ethics and Corporate Governance”, HP  
H
2. H.R.Machiraju: “Corporate Governance”
3. K. Venkataramana, “Corporate Governance”, SHBP.
4. N.M.Khandelwal : “Indian Ethos and Values for Managers”

**(19A52602d) ENTERPRISE RESOURCE PLANNING**

**Course Objectives :**

The objectives of this course are

- To provide a contemporary and forward-looking on the theory and practice of Enterprise Resource Planning
- To enable the students in knowing the Advantages of ERP
- To train the students to develop the basic understanding of how ERP enriches the Business organizations in achieving a multidimensional growth.
- Impart knowledge about the historical background of BPR
- To aim at preparing the students, technologically competitive and make them ready to self-upgrade with the higher technical skills.

**Syllabus**

**UNIT-I**

**Introduction to ERP:** Enterprise – An Overview Integrated Management Information, Business Modeling, Integrated Data Model Business Processing Reengineering(BPR), Data Warehousing, Data Mining, On-line Analytical Processing(OLAP), Supply Chain Management (SCM), Customer Relationship Management(CRM),

**Learning Outcomes:**

After completion of this unit student will

- Understand the concept of ERP
- Explain various Business modeling
- Know the contemporary technology like SCM, CRM
- Understand the OLAP

**UNIT-II**

**Benefits of ERP:** Reduction of Lead-Time, On-time Shipment, Reduction in Cycle Time, Improved Resource Utilization, Better Customer Satisfaction, Improved Supplier Performance, Increased Flexibility, Reduced Quality Costs, Improved Information Accuracy and Design-making Capability

**Learning Outcomes:**

After completion of this unit student will

- Understand the Advantages of ERP
- Explain the challenges associated with ERP System
- Analyze better customer satisfaction
- Differentiate Improved Information Accuracy and Design-making Capability

### **UNIT-III**

**ERP Implementation Lifecycle:** Pre-evaluation Screening, Package Evaluation, Project Planning Phase, Gap Analysis, Reengineering, Configuration, Implementation Team Training, Testing, Going Live, End-user Training, Post-implementation (Maintenance mode)

#### **Learning Outcomes:**

After completion of this unit student will

- Understand the implementation of ERP life cycle
- Explain the challenges associated with implementing ERP system
- Analyze the need of re-engineering
- Know the recent trends in team training testing and go-live

### **UNIT-IV**

**BPR:** Historical background: Nature, significance and rationale of business process reengineering (BPR), Fundamentals of BPR. Major issues in process redesign: Business vision and process objectives, Processes to be redesigned, Measuring existing processes,

#### **Learning Outcomes:**

After completion of this unit student will

- Understand the business process reengineering
- Explain the challenges associated with BPR
- Analyze the need of process redesign
- Differentiate between process to be redesign and measuring existing process

### **UNIT-V**

**IT in ERP:** Role of information technology (IT) and identifying IT levers. Designing and building a prototype of the new process: BPR phases, Relationship between BPR phases. MIS - Management Information System, DSS - Decision Support System, EIS - Executive Information System.

#### **Learning Outcomes:**

After completion of this unit student will

- Understand the role of IT
- Explain the challenges in Designing and building a prototype of the new process
- Analyze the need of MIS

- Differentiate between DSS and EIS

**Course outcomes:**

At the end of the course, students will be able to

- Understand the basic use of ERP Package and its role in integrating business functions.
- Explain the challenges of ERP system in the organization
- Apply the knowledge in implementing ERP system for business
- Evaluate the role of IT in taking decisions with MIS
- Create reengineered business processes with process redesign

**TEXT BOOKS:**

1. Pankaj Sharma. “Enterprise Resource Planning”. Aph Publishing Corporation, New Delhi, 2004.
2. Alexis Leon, “Enterprise Resource Planning”, IV Edition, Mc.Graw Hill, 2019

**REFERENCE BOOKS:**

1. Marianne Bradford “Modern ERP”, 3<sup>rd</sup> edition.
2. “ERP making it happen Thomas f. Wallace and Michael
3. Directing the ERP Implementation Michael w pelphrey

**(19A52602e) SUPPLY CHAIN MANAGEMENT**

**Course Objectives :**

The objectives of this course are

- To provide Knowledge on logistics and supply chain management
- To enable them in designing the distribution network
- To train the students in knowing the supply chain Analysis
- Impart knowledge on Dimensions of logistic
- To know the recent trends in supply chain management

**Syllabus**

**UNIT-1**

**Introduction to Supply Chain Management**

Supply chain - objectives - importance - decision phases - process view -competitive and supply chain strategies - achieving strategic fit – supply chain drivers - obstacles – framework - facilities -inventory-transportation-information-sourcing-pricing.

**Learning Outcomes:-**

After completion of this unit student will

- Understand the meaning and objectives of supply chain management
- Explain supply chain drivers
- Know the steps involved in SCM frame work
- Understand transportation information and pricing

**UNIT-2**

**Designing the distribution network**

Role of distribution - factors influencing distribution - design options - e-business and its impact – distribution networks in practice –network design in the supply chain - role of network -factors affecting the network design decisions modeling for supply chain. Role of transportation - modes and their performance – transportation infrastructure and policies - design options and their trade-offs tailored transportation.

**Learning Outcomes:-**

After completion of this unit student will

- Understand the different distribution network

- Explain the factors influencing network design in the supply chain
- Know the Role of transportation
- Analyze design options and their trade-offs

### **UNIT-3**

#### **Supply Chain Analysis.**

Sourcing - In-house or Outsource - 3rd and 4th PLs - supplier scoring and assessment, selection - design collaboration - Procurement process - Sourcing planning and analysis. Pricing and revenue management for multiple customers, perishable products, seasonal demand, bulk and spot contracts.

#### **Learning Outcomes:-**

After completion of this unit student will

- Understand the concept of supply chain Analysis
- Explain design collaboration
- Know procurement process -sourcing planning and analysis
- Understand seasonal demand, bulk and spot contracts

### **UNIT-4**

#### **Dimensions of Logistics**

A macro and micro dimension - logistics interfaces with other areas - approach to analyzing logistics systems - logistics and systems analysis - techniques of logistics system analysis - factors affecting the cost and importance of logistics. Demand Management and Customer Service Outbound to customer logistics systems - Demand Management –Traditional Forecasting - CPFRP - customer service - expected cost of stock outs - channels of distribution.

#### **Learning Outcomes:-**

After completion of this unit student will

- Understand dimensions of logistics
- Explain logistics interfaces with other areas
- Know techniques of logistics system analysis
- Understand Demand Management

### **UNIT-5**

**Recent Trends in Supply Chain Management**-Introduction, New Developments in Supply Chain Management, Outsourcing Supply Chain Operations, Co-Maker ship, The Role of E-Commerce in Supply Chain Management, Green Supply Chain Management, Distribution Resource Planning, World Class Supply Chain Management

#### **Learning Outcomes:-**

After completion of this unit student will

- Understand the recent trend in supply chain management
- Explain The Role of E-Commerce in Supply Management
- Know Green Supply Chain Management
- Understand Distribution Resource Planning

### **Course Outcomes:**

At the end of the course, students will be able to

- Understand the strategic role of logistic and supply chain management in the cost reduction and offering best service to the customer
- Understand Advantages of SCM in business
- Apply the knowledge of supply chain Analysis
- Analyze reengineered business processes for successful SCM implementation
- Evaluate Recent trend in supply chain management

### **TEXT BOOKS:**

1. Sunil Chopra and Peter Meindl, Supply Chain Management – “Strategy, Planning and Operation”, 3<sup>rd</sup> Edition, Pearson/PHI, 2007.
2. Supply Chain Management by Janat Shah Pearson Publication 2008.

### **REFERENCE BOOKS:**

1. A Logistic approach to Supply Chain Management – Coyle, Bardi, Longley, Cengage Learning, 1/e
2. Donald J Bowersox, Dand J Closs, M Bixby Coluper, “Supply Chain Logistics Management”, 2<sup>nd</sup> edition, TMH, 2008.
3. Wisner, Keong Leong and Keah-Choon Tan, “Principles of Supply Chain Management A Balanced Approach”, Cengage Learning, 1/e
4. David Simchi-Levi et al, “Designing and Managing the Supply Chain” – Concepts

**(19A05602P) BIG DATA ANALYTICS LABORATORY**

**Course Objectives:**

This course is designed to:

1. Get familiar with Hadoop distributions, configuring Hadoop and performing File management tasks
2. Experiment MapReduce in Hadoop frameworks
3. Implement MapReduce programs in variety applications
4. Explore MapReduce support for debugging
5. Understand different approaches for building Hadoop MapReduce programs for real-time applications

**Experiments:**

1. Install Apache Hadoop
2. Develop a MapReduce program to calculate the frequency of a given word in a given file.
3. Develop a MapReduce program to find the maximum temperature in each year.
4. Develop a MapReduce program to find the grades of students.
5. Develop a MapReduce program to implement Matrix Multiplication.
6. Develop a MapReduce to find the maximum electrical consumption in each year given electrical consumption for each month in each year.
7. Develop a MapReduce to analyze weather data set and print whether the day is sunny or cool day.
8. Develop a MapReduce program to find the number of products sold in each country by considering sales data containing fields like

Transaction_Date	Product	Price	Payment_Type	Name	City	State	Country	Account_Created	Last_Login	Latitude	Longitude
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9. Develop a MapReduce program to find the tags associated with each movie by analyzing movie lens data.

10. XYZ.com is an online music website where users listen to various tracks, the data gets collected which is given below.

The data is coming in log files and looks like as shown below.

UserId	TrackId	Shared	Radio	Skip
111115	222	0	1	0
111113	225	1	0	0
111117	223	0	1	1
111115	225	1	0	0

Write a MapReduce program to get the following

- Number of unique listeners
- Number of times the track was shared with others
- Number of times the track was listened to on the radio
- Number of times the track was listened to in total
- Number of times the track was skipped on the radio

11. Develop a MapReduce program to find the frequency of books published each year and find in which year maximum number of books were published using the following data.

Title	Author	Published year	Author country	Language	No of pages
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12. Develop a MapReduce program to analyze Titanic ship data and to find the average age of the people (both male and female) who died in the tragedy. How many persons are survived in each class.

The titanic data will be..

Column 1 : PassengerId

Column 2 : Survived (survived=0 & died=1)

Column 3 : Pclass

Column 4 : Name

Column 5 : Sex

Column 6 : Age

Column 7 : SibSp

Column 8 : Parch

Column 9 : Ticket

Column 10 : Fare

Column 11 : Cabin

Column 12 : Embarked

13. Develop a MapReduce program to analyze Uber data set to find the days on which each basement has more trips using the following dataset.

The Uber dataset consists of four columns they are

dispatching_base_number	date	active_vehicles	trips
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14. Develop a program to calculate the maximum recorded temperature by yearwise for the weather dataset in Pig Latin

15. Write queries to sort and aggregate the data in a table using HiveQL.

16. Develop a Java application to find the maximum temperature using Spark.

**Text Books:**

1. Tom White, “Hadoop: The Definitive Guide” Fourth Edition, O’reilly Media, 2015.

**Reference Books:**

1. Glenn J. Myatt, Making Sense of Data , John Wiley & Sons, 2007 Pete Warden, Big Data Glossary, O’Reilly, 2011.
2. Michael Berthold, David J.Hand, Intelligent Data Analysis, Spingers, 2007.
3. Chris Eaton, Dirk DeRoos, Tom Deutsch, George Lapis, Paul Zikopoulos, Uderstanding Big Data : Analytics for Enterprise Class Hadoop and Streaming Data, McGrawHill Publishing, 2012.
4. AnandRajaraman and Jeffrey David UIIman, Mining of Massive Datasets Cambridge University Press, 2012.

**Course Outcomes:**

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

1. Configure Hadoop and perform File Management Tasks (L2)
2. Apply MapReduce programs to real time issues like word count, weather dataset and sales of a company (L3)
3. Critically analyze huge data set using Hadoop distributed file systems and MapReduce (L5)
4. Apply different data processing tools like Pig, Hive and Spark.(L6)

**(19A52601P) ENGLISH LANGUAGE SKILLS LAB**

**Course Objectives**

- Students will be exposed to a variety of self instructional, learner friendly modes of language learning
- 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 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

**UNIT -I**

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 the module, the learners will be able to

- Understand different accents spoken by native speakers of English
- Make formal structured presentations on general topics using PPT slides without graphical elements
- Paraphrase short academic texts using suitable strategies and conventions

**UNIT -II**

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 the module, the learners will be able to

- Participate in formal discussions and speak clearly on a specific topic using suitable discourse markers
- Make formal structured presentations on academic topics using ppt slides with relevant graphical elements

- Write formal emails in the standard format

### **UNIT -III**

1. Listening for Discussions
2. Group Discussions
3. Writing Persuasive/argumentative essays on general topics

#### **Learning Outcomes**

At the end of the module, the learners will be able to

- Follow a discussion to identify the salient points
- Participate in group discussions using appropriate conventions and language strategies
- Produce logically coherent persuasive/argumentative essays

### **UNIT-IV**

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 the module, the learners will be able to

- Judge a film or book
- Express thoughts and ideas with acceptable accuracy and fluency with a view to reach consensus in group discussions
- Prepare a cv and write a cover letter to seek internship/ job

### **UNIT –V**

1. Writing Project Reports
2. Editing Short Texts
3. Answering FAQs in Interviews

#### **Learning Outcomes**

At the end of the module, the learners will be able to

- Collaborate with a partner to make effective presentations
- Understand the structure and produce an effective project report.
- Edit short texts according to different needs of the work place.

#### **Course Outcomes**

- Remember and understand the different aspects of the English language proficiency with emphasis on LSRW skills
- Apply communication skills through various language learning activities

- Analyze the English speech sounds, stress, rhythm, intonation and syllable division for better listening and speaking comprehension.
- Evaluate and exhibit acceptable etiquette essential in social and professional settings
- Create awareness on mother tongue influence and neutralize it in order to improve fluency in spoken English.

### **SUGGESTED SOFTWARE:**

1. Walden Infotech English Language Communication Skills.
2. iTell- Orell Digital Language Lab
3. Digital Teacher
4. LES(Learn English Select) by British council
5. TOEFL & GRE (KAPLAN, AARCO & BARRONS, USA, Cracking GRE by CLIFFS)
6. DELTA's key to the Next Generation TOEFL Test: Advanced Skills Practice.
7. Lingua TOEFL CBT Insider, by Dreamtech
8. English Pronunciation in Use (Elementary, Intermediate, Advanced) CUP
9. Cambridge Advanced Learners' English Dictionary with CD.

### **REFERENCE BOOKS:**

The software consisting of the prescribed topics elaborated above should be procured and used.

1. Meenakshi Raman & Sangeeta Sharma, "Technical Communication" O U Press 2009.
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 Learning 2008.
6. "A Textbook of English Phonetics for Indian Students", 2<sup>nd</sup> Edition, T.Balasubramanyam. (Macmillan), 2012.
7. "A Handbook for English Laboratories", E. Suresh Kumar, P. Sreehari, Foundation Books, 2011

Note: Links provided by APSHE on LSRW, grammar and vocabulary

**(19A99601) MANDATORY COURSE: RESEARCH METHODOLOGY**

**COURSE OBJECTIVES :**

The objective of this course is

- To understand the basic concepts of research and research problem
- To make the students learn about various types of data collection and sampling design
- To enable them to know the method of statistical evaluation
- To make the students understand various testing tools in research
- To make the student learn how to write a research report
- To create awareness on ethical issues in research

**Syllabus**

**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:-**

After completion of this unit student will

- Understand the concept of research and its process
- Explain various types of research
- Know the steps involved in research design
- Understand the different research approaches

**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 Series Analysis – Interpolation and Extrapolation. Data Collection Methods – Primary Data – Secondary data – Questionnaire Survey and Interviews.

**Learning Outcomes:-**

After completion of this unit student will

- Understand the concept of sampling and sampling design
- Explain various techniques in measurement and scaling
- Learn various methods of data collection
- Design survey questionnaires for different kinds of research
- Analyze the questionnaires

### **UNIT- III**

Correlation and Regression Analysis – Method of Least Squares – Regression vs Correlation – Correlation vs Determination – Types of Correlations and Their Applications

#### **Learning Outcomes:-**

After completion of this unit student will

- Know the association of two variables
- Understand the importance of correlation and regression
- Compare and contrast correlation and regression
- Learn various types of correlation
- Apply the knowledge of C&R Analysis to get the results

### **UNIT -IV**

Statistical Inference: Tests of Hypothesis – Parametric vs Non-parametric Tests – Hypothesis Testing Procedure – Sampling Theory – Sampling Distribution – Chi-square Test – Analysis of variance and Co-variance – Multivariate Analysis

#### **Learning Outcomes:-**

After completion of this unit student will

- Know the statistical inference
- Understand the hypothesis testing procedure
- Compare and contrast Parametric and Non-parametric Tests
- Understand the use of chi-square test in investigating the distribution of categorical variables
- Analyze the significance of variance and covariance

### **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:-**

After completion of this unit student will

- Learn about report writing

- Understand how to write research paper
- Explain various techniques of interpretation
- Understand the importance of professional ethics in research
- Design a scientific paper to present in the conferences/seminars

**Course Outcomes:**

At the end of the course, students will be able to

- Understand basic concepts and its methodologies
- Demonstrate the knowledge of research processes
- Read, comprehend and explain research articles in their academic discipline
- Analyze various types of testing tools used in research
- Design a research paper without any ethical issues

**Text books:**

1. C.R.Kothari, “Research Methodology:Methods and Techniques”,2<sup>nd</sup> edition, New Age International Publishers.
2. A Step by Step Guide for Beginners, “Research Methodology”: Ranjit Kumar, Sage Publications

**REFERENCES:**

1. P.Narayana Reddy and G.V.R.K.Acharyulu, “Research Methodology and Statistical Tools”, 1<sup>st</sup> Edition, Excel Books,New Delhi.
2. Donald R. “Business Research Methods”, Cooper & Pamela S Schindler, 9<sup>th</sup> edition.
3. S C Gupta, “Fundamentals of Statistics”, 7<sup>th</sup> edition Himalaya Publications.



**(19A05701T) INTERNET OF THINGS**

**(Common to CSE & IT)**

**Course Objectives:**

This course is designed to:

- Introduce the fundamental concepts of IoT and physical computing
- Expose the student to a variety of embedded boards and IoT Platforms
- Create a basic understanding of the communication protocols in IoT communications.
- Familiarize the student with application program interfaces for IoT.
- Enable students to create simple IoT applications.

**UNIT I**

**Overview of IoT:**

**The Internet of Things:** An Overview, The Flavour of the Internet of Things, The “Internet” of “Things”, The Technology of the Internet of Things, Enchanted Objects, Who is Making the Internet of Things?

**Design Principles for Connected Devices:** Calm and Ambient Technology, Privacy, Web Thinking for Connected Devices, Affordances.

**Prototyping:** Sketching, Familiarity, Costs Vs Ease of Prototyping, Prototypes and Production, Open source Vs Close source, Tapping into the community.

**Learning Outcomes:**

After completing this Unit, students will be able to

- Explain IoT architecture. [L2]
- Interpret the design principles that govern connected devices [L2]
- Summarize the roles of various organizations for IoT [L2]
- Interpret the significance of Prototyping [L2]

**UNIT II**

**Embedded Devices:**

Electronics, Embedded Computing Basics, Arduino, Raspberry Pi, Mobile phones and tablets, Plug Computing: Always-on Internet of Things

**Learning Outcomes:**

After completing this Unit, students will be able to

- Explain the basics of microcontrollers [L2]
- Outline the architecture of Arduino [L2]
- Develop simple applications using Arduino [L3]
- Outline the architecture of Raspberry Pi [L2]
- Develop simple applications using Raspberry Pi [L3]
- Select a platform for a particular embedded computing application [L3]

### **UNIT III**

#### **Communication in the IoT:**

Internet Communications: An Overview, IP Addresses, MAC Addresses, TCP and UDP Ports, Application Layer Protocols

#### **Prototyping Online Components:**

Getting Started with an API, Writing a New API, Real-Time Reactions, Other Protocols Protocol

#### **Learning Outcomes:**

**After completing this Unit, students will be able to**

- Interpret different protocols and compare them [L2]
- Select which protocol can be used for a specific application [L3]
- Utilize the Internet communication protocols for IoT applications [L3]
- Select IoT APIs for an application [L3]
- Design and develop a solution for a given application using APIs [L6]
- Test for errors in the application [L4]

### **UNIT IV**

**Business Models:** A short history of business models, The business model canvas, Who is the business model for, Models, Funding an Internet of Things startup, Lean Startups.

**Manufacturing:** What are you producing, Designing kits, Designing printed circuit boards.

#### **Learning Outcomes:**

After completing this Unit, students will be able to

- Plan the business model [L6]
- Predict the market value [L6]
- Build the product [L6]

### **UNIT V**

**Manufacturing continued:** Manufacturing printed circuit boards, Mass-producing the case and other fixtures, Certification, Costs, Scaling up software.

**Ethics:** Characterizing the Internet of Things, Privacy, Control, Environment, Solutions.

### **Learning Outcomes:**

After completing this Unit, students will be able to

- Outline the manufacturing techniques [L2]
- Adapt the Ethics of the IoT[L6]

### **Course outcomes:**

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

- Choose the sensors and actuators for an IoT application (L1)
- Select protocols for a specific IoT application (L2)
- Utilize the cloud platform and APIs for IoT applications (L3)
- Experiment with embedded boards for creating IoT prototypes (L3)
- Design a solution for a given IoT application (L6)

### **Text Book:**

1. Adrian McEwen, Hakim Cassimally - Designing the Internet of Things, Wiley Publications, 2012

### **Reference Books:**

1. Arshdeep Bahga, Vijay Madisetti - Internet of Things: A Hands-On Approach, Universities Press, 2014.
2. The Internet of Things, Enabling technologies and use cases – Pethuru Raj, Anupama C. Raman, CRC Press.

### **Reference sites:**

1. <https://www.arduino.cc/>
2. <https://www.raspberrypi.org/>

(19A05702T) SOFTWARE TESTING  
(Common to CSE & IT)

**Course Objectives:**

This course is designed to:

- Acquire knowledge on distinct types of testing methodologies..
- Describe the principles and procedures for designing test cases.
- Understand the stages of testing from Development to acceptance testing

**UNIT I**

**Introduction:** Purpose of Testing, Dichotomies, Model for Testing, Consequences of Bugs, Taxonomy of Bugs.

**Flow graphs and Path testing:** Basics Concepts of Path Testing, Predicates, Path Predicates and Achievable Paths, Path Sensitizing, Path Instrumentation, Application of Path Testing.

Learning Outcomes:

At the end of the unit, students will be able to:

- Explain the purpose of Testing. (L2)
- Interpret the need of testing (L2)
- Classify different types of Bugs. (L4)

**UNIT II**

**Transaction Flow Testing:** Transaction Flows, Transaction Flow Testing Techniques.

**Dataflow testing:** Basics of Dataflow Testing, Strategies in Dataflow Testing, Application of Dataflow Testing.

Learning Outcomes:

At the end of the unit, students will be able to:

- Apply data flow testing (L3)
- Design Transaction flow testing (L6)
- Outline the strategies of dataflow testing. (L2)
- List the applications of dataflow testing. (L1)

**UNIT III**

**Domain Testing:** Domains and Paths, Nice & Ugly Domains, Domain testing, Domains and Interfaces Testing, Domain and Interface Testing, Domains and Testability.

Learning Outcomes:

At the end of the unit, students will be able to:

- Apply testing in various domains. (L3)

## **UNIT IV**

**Paths, Path products and Regular expressions:** Path Products & Path Expression, Reduction Procedure, Applications, Regular Expressions & Flow Anomaly Detection.  
**Logic Based Testing:** Overview, Decision Tables, Path Expressions, KV Charts, Specifications.

Learning Outcomes:

At the end of the unit, students will be able to:

- Analyze the paths in testing.(L4)
- Design testing for checking the logic (L6)

## **UNIT V:**

**State, State Graphs and Transition Testing:** State Graphs, Good & Bad State Graphs, State Testing, Testability Tips.

**Graph Matrices and Application:** Motivational Overview, Matrix of Graph, Relations, Power of a Matrix, Node Reduction Algorithm, Building Tools.

Learning Outcomes:

At the end of the unit, students will be able to:

- Use state graphs for testing. (L3)
- Create algorithms for node reduction (L6)

## **Course Outcomes:**

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

- Choose Test cases that are geared to discover the program defects (L5)
- Design test cases before writing code and run these tests automatically (L6)
- Formulate test cases for testing different programming constructs .(L6)
- Test the applications using different testing methods and automation tools.(L3)

## **Text Books:**

1. Boris Beizer, “Software testing techniques”, Dreamtech, second edition, 2002.

## **Reference Books :**

1. Brian Marick, “The craft of software testing”, Pearson Education.
2. Yogesh Singh, “Software Testing”, Camebridge
3. P.C. Jorgensen, “Software Testing” 3rd edition, Aurbach Publications (Dist.by SPD).
4. N.Chauhan, “Software Testing”, Oxford University Press.
5. P.Ammann&J.Offutt, “Introduction to Software Testing” , Cambridge Univ. Press.
6. Perry, “Effective methods of Software Testing”, John Wiley, 2nd Edition, 1999.

**(19A05703a) CLOUD COMPUTING**  
**(Professional Elective-III)**

**Course Objectives:**

This course is designed to:

- Define cloud services and models
- Demonstrate design the architecture for new cloud application.
- Explain how to re-architect the existing application for the cloud.

**Unit-I:** Introduction to Cloud Computing, Characteristics of Cloud Computing, Cloud Models, Cloud Services Examples, Cloud based services and Applications, Cloud Concepts and Technologies, Virtualization, Load Balancing, Scalability and Elasticity, Deployment, Replication, Monitoring, Software defined networking, Network function virtualization, Map Reduce, Identity and Access Management, Service Level Agreements, Billing.

**Learning Outcomes**

At the end of the unit, students will be able to:

- Outline the Cloud characteristics and models.(L2)
- Classify different models, different technologies in cloud.(L2)

**Unit-II:** Cloud Services and Platforms: Compute Services, Storage Services, Database Services, Application Services, Content Delivery Services, Analytics Services, Deployment and Management Services, Identity and Access Management Services, Open Source Private Cloud Software, Apache Hadoop, Hadoop MapReduce Job Execution, Hadoop Schedulers, Hadoop Cluster Setup.

**Learning Outcomes:**

At the end of the unit, students will be able to:

- Summarize the Services and Platform of cloud.(L2)
- Demonstrate Hadoop Cluster Setup. (L2)

**Unit-III:**Cloud Application Design: Design Considerations, Reference Architectures, Cloud Application Design Methodologies, Data Storage Approaches,

Multimedia Cloud: Introduction, Case Study: Live Video Streaming App, Streaming Protocols, Case Study: Video Transcoding APP.

**Learning Outcomes:**

At the end of the unit, students will be able to:

- Design and build cloud applications.(L6)
- Describe the multimedia cloud. (L2)

**Unit-IV:** Python for Amazon Web Services, Python for Google Cloud Platform, Python for Windows Azure, Python for MapReduce, Python Packages of Interest, Python Web Application Framework – Django, Designing a RESTful Web API.

**Learning Outcomes:**

At the end of the unit, students will be able to:

- Select different cloud services from different vendors (L2)
- Utilize Python language to access cloud services (L3)

**Unit-V:** Cloud Application Development in Python, Design Approaches, Image Processing APP, Document Storage App, MapReduce App, Social Media Analytics App, Cloud Application Benchmarking and Tuning, Cloud Security, Cloud Computing for Education.

**Learning Outcomes:**

At the end of the unit, students will be able to:

- Investigate different Cloud applications. (L4)
- Design cloud applications using Python. (L6)

**Course Outcomes:**

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

- Outline the procedure for Cloud deployment (L2)
- Distinguish different cloud service models and deployment models (L4)
- Compare different cloud services. (L5)
- Design applications for an organization which use cloud environment. ( L6)

**Textbooks:**

1. Arshadeep Bhaga, Vijay Madiseti, “Cloud Computing A Handson Approach”, Universities Press, 2018.

**References:**

1. Chris Hay, Brian Prince, “Azure in Action” Manning Publications [ISBN: 9781935182481],2010.
2. Henry Li, “Introducing Windows Azure” Apress; 1 edition [ISBN: 978-14302-2469-3],2009.
3. Eugenio Pace, Dominic Betts, Scott Densmore, Ryan Dunn, Masashi Narumoto, MatiasWoloski, “Developing Applications for the Cloud on the Microsoft Windows Azure Platform” Microsoft Press; 1 edition [ISBN: 9780735656062],2010.
4. Eugene Ciurana, “Developing with Google App Engine” Apress; 1 edition [ISBN: 978-1430218319],2009.
5. Charles Severance, “Using Google App Engine” O'Reilly Media; 1 edition, [ISBN: 978-0596800697], 2009.

**(19A05703b) NATURAL LANGUAGE PROCESSING**

**Professional Elective - III**

**Course Objectives:**

This course is designed to:

- Explain and apply fundamental algorithms and techniques in the area of natural language processing (NLP)
- Discuss approaches to syntax and semantics in NLP.
- Examine current methods for statistical approaches to machine translation.
- Explore machine learning techniques used in NLP.

**UNIT I:**

**Introduction to Natural language**

The Study of Language, Applications of NLP, Evaluating Language Understanding Systems, Different Levels of Language Analysis, Representations and Understanding, Organization of Natural language Understanding Systems, Linguistic Background: An outline of English Syntax.

**Learning Outcomes:**

At the end of the module, students will be able to:

- Classify various NLP Applications (L2)
- Apply the logic by using Python Programming(L3)
- List the AI Languages (L1)
- Outline the Linguistic Background (L2)

**Unit II: Grammars and Parsing**

Grammars and Parsing- Top- Down and Bottom-Up Parsers, Transition Network Grammars, Feature Systems and Augmented Grammars, Morphological Analysis and the Lexicon, Parsing with Features, Augmented Transition Networks, Bayes Rule, Shannon game, Entropy and Cross Entropy.

**Learning Outcomes:**

At the end of the module, students will be able to:

- Demonstrate the Top- Down and Bottom-Up Parsing techniques (L2)
- Apply Bayes Rule, Shannon game, Entropy and Cross Entropy. (L3).
- Develop game playing strategies using Shannon game. (L3)



### **UNIT III: Grammars for Natural Language**

Grammars for Natural Language, Movement Phenomenon in Language, Handling questions in Context Free Grammars, Hold Mechanisms in ATNs, Gap Threading, Human Preferences in Parsing, Shift Reduce Parsers, Deterministic Parsers.

#### **Learning Outcomes:**

At the end of the module, students will be able to:

- Classify Grammars for Natural Language (L2)
- Explain Hold Mechanisms in ATNs. (L2)
- Explain Human Preferences in Parsing. (L2)

### **UNIT IV:**

#### **Semantic Interpretation**

Semantic & Logical form, Word senses & ambiguity, The basic logical form language, Encoding ambiguity in the logical Form, Verbs & States in logical form, Thematic roles, Speech acts & embedded sentences, Defining semantics structure model theory.

#### **Language Modeling**

Introduction, n-Gram Models, Language model Evaluation, Parameter Estimation, Language Model Adaption, Types of Language Models, Language-Specific Modeling Problems, Multilingual and Crosslingual Language Modeling.

#### **Learning Outcomes:**

At the end of the module, students will be able to:

- Distinguish Language model Evaluation (L4)
- List the types of Language Models (L1)

### **UNIT V:**

#### **Machine Translation**

Survey: Introduction, Problems of Machine Translation, Is Machine Translation Possible, Brief History, Possible Approaches, Current Status. Anusaraka or Language Accessor: Background, Cutting the Gordian Knot, The Problem, Structure of Anusaraka System, User Interface, Linguistic Area, Giving up Agreement in Anusarsaka Output, Language Bridges.

#### **Multilingual Information Retrieval**

Introduction, Document Preprocessing, Monolingual Information Retrieval, CLIR, MLIR, Evaluation in Information Retrieval, Tools, Software and Resources.

#### **Multilingual Automatic Summarization**

Introduction, Approaches to Summarization, Evaluation, How to Build a Summarizer, Competitions and Datasets.

## **Learning Outcomes:**

At the end of the module, students will be able to:

- Apply Machine Translation techniques. (L3)
- Elaborate Multilingual Information Retrieval and Multilingual Automatic Summarization. (L6)

## **Course Outcomes:**

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

- Build NLP applications using Python. (L6)
- Apply various Parsing techniques, Bayes Rule, Shannon game, Entropy and Cross Entropy. (L3)
- Explain the fundamentals of CFG and parsers and mechanisms in ATN's. (L2)
- Apply Semantic Interpretation and Language Modeling..(L3)
- Interpret Machine Translation and multilingual Information Retrieval systems and Automatic Summarization.(L2)

## **TEXT BOOKS:**

1. James Allen, Natural Language Understanding, 2nd Edition, 2003, Pearson Education.
2. Multilingual Natural Language Processing Applications : From Theory To Practice- Daniel M.Bikel and Imed Zitouni, Pearson Publications.
3. Natural Language Processing, A paninian perspective, Akshar Bharathi,Vineet chaitanya,Prentice –Hall of India.

## **REFERENCES BOOKS:**

1. Charniack, Eugene, Statistical Language Learning, MIT Press, 1993.
2. Jurafsky, Dan and Martin, James, Speech and Language Processing, 2nd Edition, Prentice Hall, 2008.
3. Manning, Christopher and Henrich, Schutze, Foundations of Statistical Natural Language Processing, MIT Press, 1999.

**(19A05703c) AGILE METHODOLOGIES**  
**Professional Elective - III**

Course Objectives:

This course is designed to:

- Master the art of agile development.
- Understand how an iterative, incremental development process leads to faster delivery of more useful software.
- Elucidate the essence of agile development methods
- Explain the principles and practices of extreme programming

UNIT I:

Why Agile? , How to be Agile, Understanding XP, Values and Principles, Improve the Process, Eliminate Waste, Deliver Value.

**Learning Outcomes:**

After completing this Unit, students will be able to

- Appraise the importance of Agile and the philosophy behind being Agile (L5)
- Interpret the questions that helps to eliminate waste from the process and increase one's agility (L2)

UNIT II:

Practicing XP-Thinking, Pair Programming, Energized Work, Informative Workspace, RootCause Analysis, Retrospectives, Collaborating, Sit Together, Real Customer Involvement, Ubiquitous Language, Stand-Up Meetings, Coding Standards, Iteration Demo, Reporting.

**Learning Outcomes:**

After completing this Unit, students will be able to

- Apply practices to excel as mindful developers (L3)
- Illustrate the eight practices to help a team and its stakeholders collaborate efficiently and effectively (L2)

UNIT III:

Releasing-Done Done, No Bugs, Version Control, Ten-Minute Build, Continuous Integration, Collective Code Ownership, Documentation.

**Learning Outcomes:**

After completing this Unit, students will be able to

- Examine pushing software into production (L4)
- Explain the importance of documentation in ensuring the long-term maintainability of the product at appropriate times. (L2)

#### UNIT IV:

Planning-Vision, Release Planning, Risk Management, Iteration Planning, Stories, Estimating.

#### **Learning Outcomes:**

After completing this Unit, students will be able to

- List the eight practices that allows to control the chaos of endless possibility (L1)

#### UNIT V:

Developing-Incremental Requirements, Customer Tests, Test- Driven Development, Refactoring, Incremental Design and Architecture, Spike Solutions, Performance Optimization.

#### **Learning Outcomes:**

After completing this Unit, students will be able to

- Outline the practices that keep the code clean and allow the entire team to contribute to development. (L2)

#### **Course outcomes:**

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

- Adopt Extreme Programming (L1)
- Create own agile method by customizing XP to a particular situation(L6)

#### **Text Books:**

1. James Shore and Shane Warden, “ The Art of Agile Development”, O’REILLY, 2007.

#### **References:**

1. Robert C. Martin, “Agile Software Development, Principles, Patterns, and Practices” , PHI, 2002.
2. Angel Medinilla, “Agile Management: Leadership in an Agile Environment”, Springer, 2012.
3. Bhuvan Unhelkar, “The Art of Agile Practice: A Composite Approach for Projects and Organizations”, CRC Press.
4. Jim Highsmith, “Agile Project Management”, Pearson education, 2004.

**(19A01704a) AIR POLLUTION AND CONTROL**  
**OPEN ELECTIVE-III**

**Course Objectives:**

- To identify the sources of air pollution
- To know the composition and structure of atmosphere
- To know the pollutants dispersion models
- To understand the working of air pollution control equipments
- To identify the sources of noise pollution and their controlling methods

**UNIT I**

Introduction: sources, effects on – ecosystems, characterization of atmospheric pollutants, air pollution episodes of environmental importance. Indoor Air Pollution– sources, effects.

**Learning Outcomes:**

After completing this Unit, students will be able to

- To understand the character of atmospheric pollutants and their effects

**UNIT II**

Meteorology - composition and structure of the atmosphere, wind circulation, solar radiation, lapse rates, atmospheric stability conditions, wind velocity profile, Maximum Mixing Depth (MMD), Temperature Inversions, Wind rose diagram.

**Learning Outcomes:**

After completing this Unit, students will be able to

- Understand the composition and structure and structure of atmosphere
- To understand the maximum mixing depth and windrose diagram

**UNIT III**

General characteristics of stack emissions, plume behaviour, heat island effect. Pollutants dispersion models – description and application of point, line and areal sources. Monitoring of particulate matter and gaseous pollutants –respirable, non-respirable and nano - particulate matter. CO, CO<sub>2</sub>, Hydrocarbons (HC), SOX and NOX, photochemical oxidants.

**Learning Outcomes:**

After completing this Unit, students will be able to

- To know about the general characteristics of stack emissions and their behavior
- To understand the monitoring of particulate matter and gaseous pollutants

#### **UNIT IV**

Air Pollution Control equipment for particulate matter & gaseous pollutants– gravity settling chambers, centrifugal collectors, wet collectors, fabric filters, electrostatic precipitator (ESP). – Adsorption, Absorption, Scrubbers, Condensation and Combustion.

##### **Learning Outcomes:**

After completing this Unit, students will be able to

- To know about the various air pollution control equipments

#### **UNIT V**

Noise - sources, measurements, effects and occupational hazards. Standards, Noise mapping, Noise attenuation equations and methods, prediction equations, control measures, Legal aspects of noise.

##### **Learning Outcomes:**

After completing this Unit, students will be able to

- To know about the noise sources, mapping, prediction equations etc.,

##### **Course Outcomes:**

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

- Identify the sources of air pollution
- Understand the composition and structure and structure of atmosphere.
- Know about the general characteristics of stack emissions and their behavior
- Know about the general characteristics of stake emission and their behavior
- Know about the noise sources, mapping, prediction equations etc.,

#### **REFERENCES:**

1. WarkK ., Warner C.F., and Davis W.T., “Air Pollution - Its Origin and Control”, Harper & Row Publishers, New York.
2. Lee C.C., and Lin S.D., “Handbook of Environmental Engineering Calculations”, McGraw Hill, New York.
3. Perkins H.C., “Air Pollution”, McGraw Hill.
4. Crawford M., “Air Pollution Control Theory”, TATA McGraw Hill.
5. Stern A.C., “Air Pollution”, Vol I, II, III.
6. Seinfeld N.J., “Air Pollution”, McGraw Hill.
7. Stern A.C. Vol. V, “Air Quality Management”.
8. M N Rao and HVN Rao, “Air Pollution” Tata McGraw Hill publication

**(19A01704b) BASICS OF CIVIL ENGINEERING**  
**OPEN ELECTIVE-III**

**Course Objectives:**

- To identify the traditional materials that are used for building constructions
- To know the principles of building planning
- To know the causes of dampness in structures and its preventive measures
- To know about the low cost housing techniques
- To know the basic principles of surveying

**UNIT I**

Traditional materials: Stones- Types of stone masonry -Brick-types of brick masonry- lime Cement – Timber – Seasoning of timber - their uses in building works

**Learning Outcomes:**

After completing this Unit, students will be able to

- To understand the characteristics of different building materials.

**UNIT II**

Elements of building planning- basic requirements-orientation-planning for energy efficiency- planning based on utility-other requirements.

**Learning Outcomes:**

After completing this Unit, students will be able to

- To understand the principles of planning in buildings

**UNIT III**

Dampness and its prevention: Causes of dampness- ill effects of dampness-requirements of an ideal material for damp proofing-materials for damp proofing –methods of damp proofing.

**Learning Outcomes:**

After completing this Unit, students will be able to

- To know about the causes of dampness in buildings and its ill effects
- To know about the general characteristics of ideal material for damp proofing

**UNIT IV**

Cost effective construction techniques in mass housing schemes: Minimum standards – Approach to cost effective mass housing schemes- cost effective construction techniques.

**Learning Outcomes:**

After completing this Unit, students will be able to

- To know about the various cost effective techniques in mass housing schemes.

**UNIT V**

Introduction to Surveying: Object and uses of surveying- Primary divisions in surveying- Fundamental principles of surveying- Classification of surveying-plans and maps-scales-types of graphical scales- units and measurements

**Learning Outcomes:**

After completing this Unit, students will be able to

- To know about the objects of surveying and its classification.

**Course Outcomes:**

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

- Identify the traditional building materials that are used in building construction.
- Plan the buildings based on principles of planning.
- Identify the sources of dampness and its ill effects on buildings and its prevention.
- Know the cost effective construction in mass housing schemes.
- Know the importance of surveying in planning of the buildings.

**Text books:**

1. S.S.Bhavikatti, “Basic civil engineering”, New age international publishers.
2. S.S.Bhavikatti, “Building Construction:”, Vikas Publishing house, New Delhi.
3. G.C.Sahu and Joygopal jena, “Building materials and Construction”, McGraw Hill Education.

**Reference books:**

1. N.Subramanian, “Building Materials testing and sustainability”, Oxford university press.



**(19A02704a) RENEWABLE ENERGY SYSTEMS**

**OPEN ELECTIVE-III**

**Course Objectives:**

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

- 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**

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 the course 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**

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:**

After completing this Unit, students 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**

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:**

After completing this Unit, students 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**

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:**

After completing this Unit, students 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**

**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:**

After completing this Unit, students 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

**Course Outcomes:**

Upon the successful completion of this course, the students 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

**Text Books:**

1. Stephen Peake, “Renewable Energy Power for a Sustainable Future”, Oxford International Edition, 2018.
2. G. D. Rai, “Non-Conventional Energy Sources”, 4<sup>th</sup> Edition, Khanna Publishers, 2000.

**References:**

1. S. P. Sukhatme, “Solar Energy”, 3<sup>rd</sup> 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”, 3<sup>rd</sup> 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 Objectives:**

After completing this Unit, students will be able to

- 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**

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:**

After completing this Unit, students will be able to

- To know about past, present and latest technologies of EV
- To understand about configurations of EV systems
- To distinguish between EV parameters and performance parameters of EV systems
- To distinguish between single and multiple motor drive EVs
- To understand about in-wheel EV

**UNIT-II**

**EV and Energy Sources**

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:**

After completing this Unit, students will be able to

- To know about various types of EV sources
- To understand about e-mobility
- To know about environmental aspects of EV

- To distinguish between conventional and recent technology developments in EV systems

### **UNIT-III**

#### **EV Propulsion and Dynamics**

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:**

After completing this Unit, students will be able to

- To know about what is meant by propulsion system
- To understand about single and multi motor EV configurations
- To get exposed to current and recent applications of EV
- To understand about load factors in vehicle dynamics
- To know what is meant acceleration in EV

### **UNIT-IV**

#### **Fuel Cells**

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:**

After completing this Unit, students will be able to

- To know about fuel cell technology of EV
- To know about basic operation of FCEV
- To know about characteristics and sizing of EV with suitable example
- To get exposed to concept of Hybrid Electric Vehicle using fuel cells
- To know about the comparison of various hybrid EV systems

### **UNIT-V**

#### **Battery Charging and Control**

**Battery charging:** Basic requirements, charger architecture, charger functions, wireless charging, power factor correction.

**Control:** Introduction, modelling of electro mechanical system, feedback controller design approach, PI controllers designing, torque-loop, speed control loop compensation, acceleration of battery electric vehicle

**Learning Outcomes:**

After completing this Unit, students will be able to

- To understand about basic requirements of battery charging and its architecture
- To know about charger functions
- To get exposed to wireless charging principle
- To understand about block diagram, modelling of electro mechanical systems of EV
- To be able to design various compensation requirements

**Course Outcomes:**

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

- To understand and differentiate between conventional and latest trends in Electric Vehicles
- To know about various configurations in parameters of EV system
- To know about propulsion and dynamic aspects of EV
- To understand about fuel cell technologies in EV and HEV systems
- To understand about battery charging and controls required of EVs

**TEXT BOOKS:**

1. C.C Chan, K.T Chau: “Modern Electric Vehicle Technology”, Oxford University Press Inc., New York 2001.
2. James Larminie, John Lowry, “Electric Vehicle Technology Explained”, Wiley, 2003.

**REFERENCE BOOKS:**

1. Iqbal Husain,, “Electric and Hybrid Vehicles Design Fundamentals”, CRC Press 2005.
2. Ali Emadi, “Advanced Electric Drive Vehicles”, CRC Press, 2015.

(19A03704a) FINITE ELEMENT METHODS  
OPEN ELECTIVE-III

**Course Objectives:**

- 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 to finite element methods for solving field problems, Stress and equilibrium, Boundary conditions, Strain-Displacement relations, Stress- strain relations for 2D and 3D Elastic problems. Potential energy and equilibrium, The Rayleigh-Ritz method, Formulation of Finite Element Equations.

**One dimensional problems:** Finite element modeling coordinates and shape functions. Assembly of global stiffness matrix and load vector. Finite element equations, Treatment of boundary conditions, Quadratic shape functions.

**Learning Outcomes:**

At the end of the unit, the student will be able to

- Understand the concept of nodes and elements.(12)
- Understand the general steps of finite element methods.(12)
- Understand the role and significance of shape functions in finite element formulations (12)
- Formulate and solve axially loaded bar problems. (16)

**UNIT - II**

**Analysis of trusses:** Stiffness Matrix for plane truss element. Stress Calculations and Problems.

**Analysis of beams:** Element Stiffness Matrix for two noded, two degrees of freedom per node beam element and simple problems.

**Learning Outcomes:**

At the end of the unit, the student will be able to

- Explain the use of the basic finite elements for structural applications using truss and beam. (12)
- Formulate and analyze truss and beam problems. (16)

### UNIT - III

Finite element modeling of two dimensional stress analysis - constant strain triangles-quadrilateral element-treatment of boundary conditions. Estimation of load Vector, Stresses. Finite element modeling of Axi-symmetric solids subjected to axi-symmetric loading with triangular elements. Two dimensional four noded Isoparametric elements and problems.

#### Learning Outcomes:

At the end of the unit, the student will be able to

- Explain the formulation of two – dimensional elements (Triangular and Quadrilateral Elements). (L2)
- Apply the formulation techniques to solve two – dimensional problems using triangle and quadrilateral elements. (L3)
- Formulate and solve axisymmetric problems.(L6)

### UNIT - IV

**Steady state heat transfer analysis:** One dimensional analysis of slab and fin, two dimensional analysis of thin plate.

Analysis of a uniform shaft subjected to torsion loading.

#### Learning Outcomes:

At the end of the unit, the student will be able to

- Explain the application and use of the Finite Element Methods for heat transfer problems. (L2)
- Formulate and solve heat transfer problems. (L6)
- Analyse the

### UNIT V

**Dynamic analysis:** Formulation of finite element model, element –mass matrices, evaluation of Eigen values and Eigen vectors for a stepped bar truss.

**3D Problems:** Finite Element formulation- Tetrahedron element-Stiffness matrix.

#### Learning Outcomes:

At the end of the unit, the student will be able to

- Understand problems involving dynamics using Finite Element Methods.
- Evaluate the Eigen values and Eigen Vectors for stepped bar.
- Develop the stiffness matrix for tetrahedron element.



## **Course Outcomes:**

Upon successful completion of this course you should be able to

- Understand the concepts behind variational methods and weighted residual methods in FEM.
- Identify the application and characteristics of FEA elements such as bars, beams, and isoparametric elements, and 3-D element.
- Develop element characteristic equation procedure and generation of global stiffness equation will be applied.
- Able to apply Suitable boundary conditions to a global structural equation, and reduce it to a solvable form.
- Able to identify how the finite element method expands beyond the structural domain, for problems involving dynamics, heat transfer and fluid flow.

## **TEXT BOOKS**

1. Chandraputla, Ashok & Belegundu, "Introduction to Finite Element in Engineering", Prentice Hall.
2. S.S.Rao, "The Finite Element Methods in Engineering", 2<sup>nd</sup> Edition, Elsevier Butterworth - Heinemann 2011.

## **REFERENCE BOOKS**

1. J N Reddy, "An introduction to the Finite Element Method", McGraw – Hill, New York, 1993.
2. R D Cook, D S Malkus and M E Plesha, "Concepts and Applications of Finite Element Analysis", 3<sup>rd</sup> Edition, John Wiley, New York, 1989.
3. K J Bathe, "Finite Element Procedures in Engineering Analysis", Prentice-Hall, Englewood Cliffs, 1982.
4. T J R Hughes, "the Finite Element Method, Prentice", Hall, Englewood Cliffs, NJ, 1986.
5. C Zienkiewicz and R L Taylor, "the Finite Element Method", 3<sup>rd</sup> Edition. McGraw-Hill, 1989.

(19A03704b) **PRODUCT MARKETING**  
**OPEN ELECTIVE-III**

**Course Objectives:**

- Introduce the basic concepts of Product marketing.
- Familiarize with market information systems and research
- Understand the nature and importance of industrial market
- Discuss the major stages in new product development
- Identify the factors affecting pricing decisions

**UNIT I:**

**Introduction (7 Hours)**

Historical development of marketing management, Definition of Marketing, Core marketing concepts, Marketing Management philosophies, Micro and Macro Environment, Characteristics affecting Consumer behaviour, Types of buying decisions, buying decision process, Classification of consumer products, Market Segmentation Concept of Marketing Myopia. Importance of marketing in the Indian Socio economic system.

**Learning Outcomes:**

At the end of this student, the student will be able to

- Define Marketing. (L1)
- Discuss marketing philosophies. (L2)
- Sketch the buying decision process. (L3)
- Understand the importance of marketing in the Indian socio economic system. (L2)

**UNIT II:**

**Marketing of Industrial Products (6 Hours)**

Components of marketing information system–benefits & uses marketing research system, marketing research procedure, Demand Estimation research, Test marketing, Segmentation Research - Cluster analysis, Discriminate analysis. Sales forecasting: objective and subjective methods. Nature and importance of the Industrial market, classification of industrial products, participants in the industrial buying process, major factors influencing industrial buying behavior, characteristics of industrial market demand. Determinants of industrial market demand Buying power of Industrial users, buying motives of Industrials users, the industrial buying process, buying patterns of industrial users.

**Learning Outcomes:**

At the end of this student, the student will be able to

- Identify the components of marketing information system. (L2)
- List the advantages and uses of marketing research system. (L1)
- Demonstrate sales forecasting. (L3)
- Explain the major factors influencing industrial buying behaviour. (L2)

### **UNIT III:**

#### **Product Management And Branding (7 Hours)**

The concept of a product, features of a product, classification of products, product policies – product planning and development, product line, product mix – factors influencing change in product mix, product mix strategies, meaning of “New – product; major stages in new – product development product life cycle. Branding: Reasons for branding, functions of branding features of types of brands, kinds of brand name.

#### **Learning Outcomes:**

At the end of this student, the student will be able to

- Identify the factors influencing change in product mix. (L2)
- Sketch various stages in product life cycle. (L2)
- Recall the features of a product and product policies. (L1)
- Demonstrate on features, functions and reasons of branding. (L3)

### **UNIT IV:**

#### **Pricing And Pacakaging (7Hours)**

Importance of Price, pricing objectives, factors affecting pricing decisions, procedure for price determination, kinds of pricing, pricing strategies and decisions Labeling: Types, functions advantages and disadvantages, Packaging: Meaning, growth of packaging, function of packaging, kinds of packaging.

#### **Learningt Outcomes:**

At the end of this student, the student will be able to

- List the factors affecting pricing decisions. (L1)
- Explain the procedure for price determination. (L2)
- Employ Pricing strategies and decisions. (L3)
- Understand the functions of labelling and packaging. (L2)

### **UNIT V:**

#### **Product Promotion (6Hours)**

Importance of Price, pricing objectives, factors affecting pricing decisions, procedure for price determination, kinds of pricing, pricing strategies and decisions. Advertising and sales

promotion: Objectives of advertisement function of advertising, classification of advertisement copy, advertisement media – kinds of media, advantages of advertising. Objectives of sales promotion, advantages sales promotion. Personal Selling : Objectives of personal selling, qualities of good salesman, types of salesman, major steps in effective selling

### **Learning Outcomes:**

At the end of this student, the student will be able to

- Discuss the procedures for price determination. (L2)
- Explain the objectives of advertisement function of advertising. (L2)
- List the advantages and disadvantages of advertising. (L1)
- Describe the major steps in effecting selling. (L2)

### **Course Outcomes:**

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

- Understand basic marketing management concepts and their relevance to business development. (L2)
- Prepare a questionnaire for market research. (L5)
- Design marketing research plan for business organizations. (L5)
- Optimize marketing mix to get competitive advantage. (L4)

### **Text Books:**

1. Philip Kotler, “Principles of Marketing”, Prentice – Hall.
2. Philip Kotler, “Marketing Management”, Prentice – Hall.

### **Reference Books:**

1. Wiliam J Stanton, “Fundamentals of Marketing”, McGraw Hill
2. R.S.N. Pillai and Mrs.Bagavathi, “Marketing”, S. Chand & Co. Ltd
3. Rajagopal, “Marketing Management Text & Cases”, Vikas Publishing House

**(19A04704a) INTRODUCTION TO MICROCONTROLLERS & APPLICATIONS**  
**OPEN ELECTIVE-III**

**Course Objectives:**

This course will enable students to:

- Describe the Architecture of 8051 Microcontroller and Interfacing of 8051 to external memory.
- Write 8051 Assembly level programs using 8051 instruction set.
- Describe the Interrupt system, operation of Timers/Counters and Serial port of 8051.
- Interface simple switches, simple LEDs, ADC 0804, LCD and Stepper Motor to 8051.

**UNIT – I**

**8051 Microcontroller:**

Microprocessor Vs Microcontroller, Embedded Systems, Embedded Microcontrollers, 8051 Architecture- Registers, Pin diagram, I/O ports functions, Internal Memory organization. External Memory (ROM & RAM) interfacing.

**Learning Outcomes:**

At the end of this student, the student will be able to

- Understand the importance of Microcontroller and acquire the knowledge of Architecture of 8051 Microcontroller. (L1)
- Analyze interface required memory of RAM & ROM. (L3)

**UNIT – II**

Addressing Modes, Data Transfer instructions, Arithmetic instructions, Logical instructions, Branch instructions, Bit manipulation instructions. Simple Assembly language program examples to use these instructions.

**Learning Outcomes:**

At the end of this student, the student will be able to

- Explain different types instruction set of 8051. (L1)
- Develop the 8051 Assembly level programs using 8051 instruction set. (L3)

**UNIT – III**

**8051 Stack, Stack and Subroutine instructions.** Simple Assembly language program examples to use subroutine instructions. 8051 Timers and Counters – Operation and Assembly

language programming to generate a pulse using Mode-1 and a square wave using Mode- 2 on a port pin.

### **Learning Outcomes:**

At the end of this student, the student will be able to

- Describe Stack and Subroutine of 8051. (L1)
- Design Timer /counters using of 8051. (L4)

### **UNIT –IV**

**8051 Serial Communication-** Basics of Serial Data Communication, RS- 232 standard, 9 pin RS232 signals, Simple Serial Port programming in Assembly and C to transmit a message and to receive data serially.**8051 Interrupts.** 8051 Assembly language programming to generate an external interrupt using a switch.

### **Learning Outcomes:**

At the end of this student, the student will be able to

- Acquire knowledge of Serial Communication and develop serial port programming. (L1)
- Develop an ALP to generate an external interrupt using a switch. (L3)

### **UNIT – V**

8051 C programming to generate a square waveform on a port pin using a Timer interrupt. Interfacing 8051 to ADC-0804, DAC, LCD and Interfacing with relays and opto isolators, Stepper Motor Interfacing, DC motor interfacing, PWM generation using 8051.

### **Learning Outcomes:**

At the end of this student, the student will be able to

- Apply and Interface simple switches, simple LEDs, ADC 0804 and LCD to using 8051 I/O ports. (L2)
- Design Stepper Motor and f motor interfacing of 8051. (L4)

### **Course outcomes:**

- Understand the importance of Microcontroller and Acquire the knowledge of Architecture of 8051 Microcontroller.
- Apply and Interface simple switches, simple LEDs, ADC 0804, LCD and Stepper Motor to using 8051 I/O ports.
- Develop the 8051 Assembly level programs using 8051 instruction set.
- Design the Interrupt system, operation of Timers/Counters and Serial port of 8051.

**TEXT BOOKS:**

1. Muhammad Ali Mazidi and Janice Gillespie Mazidi and Rollin D. McKinlay; “The 8051 Microcontroller and Embedded Systems – using assembly and C”, PHI, 2006 / Pearson, 2006.
2. Kenneth J. Ayala, “The 8051 Microcontroller”, 3rd Edition, Thomson/Cengage Learning.

**REFERENCE BOOKS:**

1. Manish K Patel, “The 8051 Microcontroller Based Embedded Systems”, McGraw Hill, 2014, ISBN: 978-93-329-0125-4.
2. Raj Kamal, “Microcontrollers: Architecture, Programming, Interfacing and System Design”, Pearson Education, 2005.

(19A04704b) PRINCIPLES OF DIGITAL SIGNAL PROCESSING  
OPEN ELECTIVE-III

**Course Objectives:**

- To explain about signals and perform various operations on it.
- To understand discrete time signals and systems.
- To solve Laplace transforms and z-transforms for various signals.
- To find Discrete Fourier Transform of a sequence by using Fast Fourier Transform.
- To design and realize IIR and FIR filters.

**UNIT- I:**

**INTRODUCTION TO SIGNALS**

Classification of Signals: Analog, Discrete, Digital, Deterministic & Random, Periodic & Aperiodic, Even & Odd, Energy & Power signals. Basic operations on signals: Time shifting, Time scaling, Time reversal, Amplitude scaling and Signal addition. Elementary Signals: Unit step, Unit ramp, Unit parabolic, Impulse, Sinusoidal function, Exponential function, Gate function, Triangular function, Sinc function and Signum function.

**Learning Outcomes:**

At the end of this student, the student will be able to

- Define basic signals and its operations, Classify discrete time signals and systems. (L1)
- Understand various basic operations on signals (L1)

**UNIT – II:**

**DISCRETE TIME SIGNALS AND SYSTEMS**

**Discrete Time Signals:** Elementary discrete time signals, Classification of discrete time signals: power and energy signals, even and odd signals. Simple manipulations of discrete time signals: Shifting and scaling of discrete-time signals.

**Discrete Time Systems:** Input-Output description of systems, Block diagram representation of discrete time systems, Linear Constant Coefficient Difference Equations, Classification of discrete time systems: linear and nonlinear, time-invariant and variant systems, causal and non causal, stable and unstable systems.

**Learning Outcomes:**



At the end of this student, the student will be able to

- Define basic signals and its operations, Classify discrete time signals and systems. (L1)
- Understand various basic operations on signals (L1)

### **UNIT- III:**

#### **LAPLACE TRANSFORMS AND Z- TRANSFORMS**

**Laplace Transforms:** Laplace transforms, Partial fraction expansion, Inverse Laplace transform, Concept of Region of Convergence (ROC), Constraints on ROC for various classes of signals, Properties of Laplace transforms.

**Z-Transforms:** Concept of Z-transform of a discrete sequence, 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 student, the student will be able to

- Understand the basic concepts of Laplace and Z transforms (L1)
- Apply the transform techniques to solve the problems (L2)

### **UNIT – IV:**

#### **FAST FOURIER TRANSFORMS**

Discrete Time Fourier Transform (DTFT), Discrete Fourier Transform (DFT), Radix-2 Fast Fourier Transforms (FFT), Decimation in Time and Decimation in Frequency FFT Algorithms: radix-2 DIT-FFT, DIF-FFT, and Inverse FFT: IDFT-FFT.

#### **Learning Outcomes:**

At the end of this student, the student will be able to

- Understand the importance of DTFT, DFT, FFT and their inverse transforms with respect to signals and systems (L1)
- Analyze the Decimation in time and frequency algorithms (L3)

### **UNIT – V:**

#### **IIR AND FIR DIGITAL FILTERS**

**IIR DIGITAL FILTERS:** Analog filters approximations: Butterworth and Chebyshev, Design of IIR digital filters from analog filters. Realization of IIR filters: Direct form-I, Direct form-II, cascade form and parallel form.

**FIR DIGITAL FILTERS:** Characteristics of FIR digital filters, frequency response. Design of FIR digital filters using window techniques: Rectangular window, Triangular or Bartlett window, Hamming window, Hanning window, Blackman window. Realization of FIR filters: Linear phase and Lattice structures.

## **Learning Outcomes:**

At the end of this student, the student will be able to

- Understand the importance of IIR and FIR digital Filters (L1)
- Realize IIR filters and analyze various windowing techniques in FIR filters (L2)
- Design IIR and FIR filters (L4)

## **Course outcomes:**

- Define basic signals and its operations, Classify discrete time signals and systems.
- Solve Laplace Transform and z-Transform for various signals, Calculate DFT of a given sequence by using Fast Fourier Transform.
- Analyze the continuous and discrete signals and systems
- Design and realize IIR and FIR filters from the given specifications.

## **TEXT BOOKS:**

1. B. P. Lathi, "Signals, Systems and Communications", BS Publications, 2008.
2. John G. Proakis, Dimitris G. Manolakis, "Digital signal processing, principles, Algorithms and applications", 4<sup>th</sup> edition , Pearson Education/PHI, 2007.
3. A.V. Oppenheim and R.W. Schaffer, "Discrete Time Signal Processing", 2<sup>nd</sup> edition., PHI.

## **REFERENCES:**

1. A.V. Oppenheim, A.S. Will sky and S.H. Nawab, "Signals and Systems", PHI, 2<sup>nd</sup> Edition, 2013.
2. A. Anand Kumar, "Signals and Systems", PHI Publications, Third Edition, 2013
3. P. Ramesh Babu. "Digital Signal Processing".
4. Andreas Antoniou, "Digital signal processing", Tata McGraw Hill, 2006.
5. R S Kaler, M Kulkarni,, Umesh Gupta, "A Text book on Digital Signal processing" –I K International Publishing House Pvt. Ltd.
6. M H Hayes, Schaum's Outlines, "Digital Signal Processing", Tata Mc-Graw Hill, 2007.

**(19A27704a) CORPORATE GOVERNANCE IN FOOD INDUSTRIES**  
**OPEN ELECTIVE III**

**PREAMBLE**

This text focuses on corporate governance, business ethics and emerging trends in food industries.

**Course Objectives**

- To understand the concepts of corporate governance in view of food industry

**UNIT – I**

Corporate Governance- A Conceptual Foundation: Concept, nature, issues and importance of corporate governance, origin and development of corporate governance, concept of corporate management, Different models of corporate governance, corporate governance in family business, corporate governance failure with examples.

**Learning Outcomes:**

At the end of unit, students will be able to understand the following

- Concept, nature, issues and importance of corporate governance
- origin and development of corporate governance, concept of corporate management
- Different models of corporate governance
- corporate governance in family business, corporate governance failure with examples

**UNIT – II**

Role Players: Role of various players viz. Role of shareholders their rights and responsibilities, Role of board of directors in corporate governance- executive and non executive directors, independent and nominee directors, Role of Auditors, audit committee, media.

**Learning Outcomes:**

At the end of unit, students will be able to understand the following

- Role of shareholders their rights and responsibilities
- Role of board of directors in corporate governance- executive and non executive directors, independent and nominee directors
- Role of Auditors, audit committee, media.

## **UNIT – III**

Corporate governance in India and the Global Scenario: Corporate Governance practices /codes in India, UK, Japan, USA. Contributions of CII-recommendations on corporate governance by different committees in India, SEBI guidelines, Kumar Manglam Birla Committee, Naresh Chandra committee Report, OECD Principles, Cadbury Committee

### **Learning Outcomes:**

At the end of unit, students will be able to understand the following

- Corporate Governance practices /codes in India, UK, Japan, USA.
- Contributions of CII-recommendations on corporate governance by different committees in India, SEBI guidelines,
- Have detail study of committees like Kumar Manglam Birla Committee, Naresh Chandra committee Report, OECD Principles, Cadbury Committee

## **UNIT – IV**

Emerging trends: Emerging Trends and latest developments in Corporate Governance. Corporate Governance initiative in India and Abroad, Corporate Governance Rating- Role of rating agencies in corporate governance. ICRA Corporate governance rating method for examining the quality and effectiveness of corporate governance.

### **Learning Outcomes:**

At the end of unit, students will be able to understand the following

- Emerging Trends and latest developments in Corporate Governance.
- Corporate Governance initiative in India and Abroad,
- Corporate Governance Rating- Role of rating agencies in corporate governance
- ICRA Corporate governance rating method for examining the quality and effectiveness of corporate governance.

## **UNIT – V**

Business ethics and corporate governance. Social responsibility and corporate governance. Corporate governance and value creation. Political economy of corporate governance.

### **Learning Outcomes:**

At the end of unit, students will be able to understand the following

- Business ethics and corporate governance.
- Social responsibility and corporate governance.
- Corporate governance and value creation.
- Political economy of corporate governance.

**Course Outcomes:**

By the end of the course, the students will

- Attain knowledge on system of corporate governance in food industries.
- Get to know about business ethics and values.

**TEXT BOOKS**

1. Subhash Chandra Das, “Corporate Governance in India”, PHI Pvt. Ltd., New Delhi(2008),
2. Dennis Campbell, “Susan Woodley Trends and Developments In Corporate Governance”. (2004)

**REFERENCES**

1. Jayati Sarkar. “Corporate Governance in India”. Sage Publications, New Delhi,2012.
2. Vasudha, Joshi “Corporate Governance The Indian Scenario”. Foundations Books Pvt. Ltd. New Delhi. 2012,

(19A27704b) PROCESS TECHNOLOGY FOR CONVENIENCE & RTE FOODS  
OPEN ELECTIVE III

**PREAMBLE**

This text focuses on various aspects and technologies involved in processing of convenience and Read-to-eat foods.

**Course Objectives:**

- To understand the importance and demand for convenience foods in present day scenario
- To learn the various technical aspects of convenience and Read-to-eat foods.

**UNIT – I**

Overview of grain-based snacks: whole grains – roasted, toasted, puffed, popped and flakes  
Coated grains-salted, spiced and sweetened Flour based snack– batter and dough based products;  
savoury and farsans; formulated chips and wafers, papads.

**Learning Outcomes:**

At the end of unit, students will be able to understand the following

- Role of cereal based ingredients in snacks industries.
- Various technologies and equipments involved in Snacks industries

**UNIT – II**

Technology for fruit and vegetable based snacks: chips, wafers, papads etc. Technology of ready to eat fruits and vegetable based food products like, sauces, fruit bars, glazed candy etc. Technology of ready to eat canned value added fruits/vegetables and mixes and ready to serve beverages etc.

**Learning Outcomes:**

At the end of unit, students will be able to understand the following

- Role of Fruits and vegetables in convenience products.
- Processing of various Fruit and vegetable based products.

**UNIT – III**

Technology of ready- to- eat baked food products, drying, toasting roasting and flaking, coating, chipping. Extruded snack foods: Formulation and processing technology, colouring, flavouring

and packaging. Technology for coated nuts – salted, spiced and sweetened products- chikkis, Sing bhujia.

### **Learning Outcomes:**

At the end of unit, students will be able to understand the following

- Various methods involved in processing of ready to eat baked products
- Various methods involved in processing of extruded snack foods
- Technology involved in processing different coated nuts

### **UNIT IV**

Technology for ready-to-cook food products- different puddings and curried vegetables etc. Technology for ready-to-cook and ready to eat meat and meat food products. Technology for preparation of instant cooked rice, carrot and other cereals based food products.

### **Learning Outcomes:**

At the end of unit, students will be able to understand the following

- Technology involved in processing different ready to cook food products
- Technology involved in processing different ready to cook and ready to eat meat and meat products
- Technology involved in processing different instant cooked cereal products

### **UNIT – V**

Technology of ready to eat instant premixes based on cereals, pulses etc. Technology for RTE puffed snack- sand puffing, hot air puffing, explosion puffing, gun puffing etc. Technology for preparation of traditional Indian dairy products.

### **Learning Outcomes:**

At the end of unit, students will be able to understand the following

- Technology involved in processing different ready to eat instant premixes based on cereals and pulses and etc.
- Technology involved in processing different RTE puffed snacks
- Technology involved in processing different traditional dairy products

### **Course Outcomes:**

By end of the course students will understand

- Technology for processing ready to eat and ready cook different products and equipment used for manufacturing of RTE products

## **TEXT BOOKS**

1. Edmund WL. "Snack Foods Processing". AVI Publ.
2. Kamaliya M.K and Kamaliya K.B. 2001. Vol.1 and 2, "Baking Science and Industries", M.K.Kamaliya Publisher, Anand.

## **REFERENCES**

1. Frame ND . "Technology of Extrusion Cooking". Blackie Academic1994. .
2. Gordon BR. "Snack Food", AVI Publ, 1997.
3. Samuel AM. "Snack Food Technology", AVI Publ. 1976.



**(19A54704a) NUMERICAL METHODS FOR ENGINEERS**

**OPEN ELECTIVE-III  
(ECE , CSE, IT & CIVIL)**

**Course objectives:**

This course aims at providing the student with the knowledge on various numerical methods for solving equations, interpolating the polynomials, evaluation of integral equations and solution of differential equations.

**UNIT-I:**

**Solution of Algebraic & Transcendental Equations:**

Introduction-Bisection method-Iterative method-Regula falsi method-Newton Raphson method. System of Algebraic equations: Gauss Jordan method-Gauss Siedal method.

**Learning Outcomes:**

Students will be able to

- Calculate the roots of equation using Bisection method and Iterative method.
- Calculate the roots of equation using Regula falsi method and Newton Raphson method.
- Solve the system of algebraic equations using Gauss Jordan method and Gauss Siedal method.

**UNIT-II:**

**Curve Fitting**

Principle of Least squares- Fitting of curves- Fitting of linear, quadratic and exponential curves.

**Learning Outcomes:**

Students will be able to

- understand curve fitting
- understand fitting of several types of curves

**UNIT-III:**

**Interpolation**

Finite differences-Newton's forward and backward interpolation formulae – Lagrange's formulae. Gauss forward and backward formula, Stirling's formula, Bessel's formula.

**Learning Outcomes:**

Students will be able to

- Understand the concept of interpolation.
- Derive interpolating polynomial using Newton's forward and backward formulae.
- Derive interpolating polynomial using Lagrange's formulae.
- Derive interpolating polynomial using Gauss forward and backward formulae.

#### **UNIT-IV:**

##### **Numerical Integration**

Numerical Integration: Trapezoidal rule – Simpson's 1/3 Rule – Simpson's 3/8 Rule

##### **Learning Outcomes:**

Students will be able to

- Solve integral equations using Simpson's 1/3 and Simpson's 3/8 rule.
- Solve integral equations using Trapezoidal rule.

#### **UNIT-V:**

##### **Solution of Initial value problems to Ordinary differential equations**

Numerical solution of Ordinary Differential equations: Solution by Taylor's series-Picard's Method of successive Approximations-Modified Euler's Method-Runge-Kutta Methods.

##### **Learning Outcomes:**

Students will be able to

- Solve initial value problems to ordinary differential equations using Taylor's method.
- Solve initial value problems to ordinary differential equations using Euler's method and Runge Kutta methods.

##### **Course Outcomes:**

After the completion of course, students will be able to

- Apply numerical methods to solve algebraic and transcendental equations.
- Understand fitting of several kinds of curves.
- Derive interpolating polynomials using interpolation formulae.
- Solve differential and integral equations numerically.

##### **Text Books:**

1. B.S.Grewal, "Higher Engineering Mathematics", Khanna publishers.
2. Ronald E. "Probability and Statistics for Engineers and Scientists", Walpole, PNIE.
3. Erwin Kreyszig, "Advanced Engineering Mathematics", Wiley India

**Reference Books:**

1. B.V.Ramana, "Higher Engineering Mathematics", Mc Graw Hill publishers.
2. Alan Jeffrey, "Advanced Engineering Mathematics", Elsevier.

**(19A51704a) CHEMISTRY OF NANOMATERIALS AND APPLICATIONS**

Course Objectives:

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

**Unit I:**

**Introduction:** Scope of nanoscience and nanotechnology, 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.

**Learning Outcomes:**

At the end of this unit, the students 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**

**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.

**Learning Outcomes:**

At the end of this unit, the students 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

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

#### **Learning Outcomes:**

At the end of this unit, the students will be able to

- Discuss different techniques 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

**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.

#### **Learning Outcomes:**

At the end of this unit, the students will be able to

- Explain synthesis and properties and applications of nanomaterials (L2)
- Discuss about fullerenes and carbon nanotubes (L3)
- Differentiate nanomagnetic materials and thermoelectric materials (L2)
- Describe liquid crystals (L2)

### UNIT.V

Engineering Applications of Nanomaterials

#### **Learning Outcomes:**

At the end of this unit, the students will be able to

- Illustrate applications of nanomaterials (L2)
- Discuss the magnetic applications of nanomaterials (L3)
- List the applications of non-linear optical materials (L1)
- Describe the applications of fullerenes, carbon nanotubes (L2)

#### **Course Outcome**

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

#### **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.

**HUMANITIES ELECTIVE-II**

**(19A52701a) ORGANISATIONAL BEHAVIOUR**

**Course Objectives :**

The objectives of this course are

- To make the student understand about the organizational behavior
- To enable them to develop self motivation, leadership and management
- To facilitate them to become powerful leaders
- Impart knowledge about group dynamics
- To make them understand the importance of change and development

**Syllabus**

**UNIT-I**

Organizational Behavior - Introduction to OB - Meaning and definition, scope - Organizing Process – Making organizing effective - Understanding Individual Behavior – Attitude - Perception - Learning - Personality Types

**Learning Outcomes:**

After completion of this unit student will

- Understand the concept of Organizational Behavior
- Contrast and compare Individual & Group Behavior and attitude
- Analyze Perceptions
- Evaluate personality types

**UNIT-II**

Motivation and Leading - Theories of Motivation - Maslow's Hierarchy of Needs - Herzberg's Two Factor Theory - Leading - Leading Vs Managing

**Learning Outcomes:**

After completion of this unit student will

- Understand the concept of Motivation
- Understand the Theories of motivation
- Explain how employees are motivated according to Maslow's Needs Hierarchy
- Compare and contrast leading and managing

**UNIT-III**

Leadership and Organizational Culture and Climate - Leadership - Traits Theory–Managerial Grid - Transactional Vs Transformational Leadership - Qualities of good Leader - Conflict Management - Evaluating Leader - Women and Corporate leadership.

### **Learning Outcomes:**

After completion of this unit student will

- Know the concept of Leadership
- Contrast and compare Traits theory and Managerial Grid
- Know the difference between Transactional and Transformational Leadership
- Evaluate the qualities of good leaders
- Emerge as the good leader

### **UNIT – IV**

Group Dynamics - Types of groups - Determinants of group behavior - Group process – Group Development - Group norms - Group cohesiveness - Small Groups - Group decision making - Team building - Conflict in the organization – Conflict resolution

### **Learning Outcomes:**

After completion of this unit student will

- Know the concept of Group Dynamics
- Contrast and compare Group behavior and group development
- Analyze Group decision making
- Know how to resolve conflicts in the organization

### **UNIT - V**

Organizational Change and Development - Organizational Culture - Changing the Culture – Change Management – Work Stress Management - Organizational management – Managerial implications of organization's change and development

### **Learning Outcomes:**

- After completion of this unit student will
- Know the importance of organizational change and development
- Apply change management in the organization
- Analyze work stress management
- Evaluate Managerial implications of organization

### **Course outcomes:**

At the end of the course, students will be able to

- Understand the nature and concept of Organizational behavior



- Apply theories of motivation to analyze the performance problems
- Analyze the different theories of leadership
- Evaluate group dynamics
- Develop as powerful leader

**TEXT BOOKS:**

1. Luthans, Fred, “Organisational Behaviour” , McGraw-Hill, 12 Th edition 2011
2. P Subba Rao, Organisational Behaviour, Himalya Publishing House 2017

**REFERENCES BOOKS:**

1. McShane, “Organizational Behaviour”, TMH 2009
2. Nelson, “Organisational Behaviour”, Thomson, 2009.
3. Robbins, P.Stephen, Timothy A. Judge, “Organisational Behaviour”, Pearson 2009.
4. Aswathappa, “Organisational Behaviour”, Himalaya, 2009

**(19A52701b) MANAGEMENT SCIENCE**

**Course objectives :**

The objectives of this course are

- To provide fundamental knowledge on Management, Administration, Organization & its concepts.
- To make the students understand the role of management in Production
- To impart the concept of HRM in order to have an idea on Recruitment, Selection, Training & Development, job evaluation and Merit rating concepts
- To create awareness on identify Strategic Management areas & the PERT/CPM for better Project Management
- To make the students aware of the contemporary issues in management

**Syllabus**

**UNIT- I**

**INTRODUCTION TO MANAGEMENT**

Management - Concept and meaning - Nature-Functions - Management as a Science and Art and both. Schools of Management Thought - Taylor's Scientific Theory-Henry Fayol's principles - Eltan Mayo's Human relations - Systems Theory - **Organisational Designs** - Line organization - Line & Staff Organization - Functional Organization - Matrix Organization - Project Organization - Committee form of Organization - Social responsibilities of Management.

**Learning Outcomes:**

At the end if the Unit, the learners will be able to

- Understand the concept of management and organization
- Apply the concepts & principles of management in real life industry.
- Analyze the organization chart & structure for an enterprise.
- Evaluate and interpret the theories and the modern organization theory.

**UNIT II**

**OPERATIONS MANAGEMENT**

Principles and Types of Plant Layout - Methods of Production (Job, batch and Mass Production), Work Study - Statistical Quality Control - Deming's contribution to Quality. **Material Management** - Objectives - Inventory-Functions - Types, Inventory Techniques - EOQ-ABC Analysis - Purchase Procedure and Stores Management - **Marketing Management** - Concept - Meaning - Nature- Functions of Marketing - Marketing Mix - Channels of Distribution - Advertisement and Sales Promotion - Marketing Strategies based on Product Life Cycle.

### **Learning Outcomes:**

At the end of the Unit, the learners will be able to

- Understand the core concepts of Management Science and Operations Management
- Apply the knowledge of Quality Control, Work-study principles in real life industry.
- Evaluate Materials departments & Determine EOQ
- Analyze Marketing Mix Strategies for an enterprise.
- Create and design advertising and sales promotion

## **UNIT III**

### **HUMAN RESOURCES MANAGEMENT (HRM)**

HRM - Definition and Meaning – Nature - Managerial and Operative functions - Evolution of HRM - Job Analysis - Human Resource Planning(HRP) - Employee Recruitment-Sources of Recruitment - Employee Selection - Process and Tests in Employee Selection - Employee Training and Development - On-the- job & Off-the-job training methods - Performance Appraisal Concept - Methods of Performance Appraisal – Placement - Employee Induction - Wage and Salary Administration

### **Learning Outcomes:**

At the end if the Unit, the learners will

- Understand the concepts of HRM in Recruitment, Selection, Training & Development
- Apply Managerial and operative Functions
- Analyze the need of training
- Evaluate performance appraisal
- Design the basic structure of salaries and wages

## **UNIT IV STRATEGIC & PROJECT MANAGEMENT**

Definition& Meaning - Setting of Vision - Mission - Goals - Corporate Planning Process - Environmental Scanning - Steps in Strategy Formulation and Implementation - SWOT Analysis - **Project Management** - 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 the Unit, the learners will be able to

- Understand Mission, Objectives, Goals & strategies for an enterprise
- Apply SWOT Analysis to strengthen the project
- Analyze Strategy formulation and implementation
- Evaluate PERT and CPM Techniques
- Creative in completing the projects within given time

## **UNIT V**

### **CONTEMPORARY ISSUES IN MANAGEMENT**

The concept of Management Information System(MIS) - Materials Requirement Planning (MRP) - Customer Relations Management(CRM) - Total Quality Management (TQM) - Six Sigma Concept - Supply Chain Management(SCM) - Enterprise Resource Planning (ERP) - Performance Management - Business Process Outsourcing (BPO) - Business Process Re-engineering and Bench Marking - Balanced Score Card - Knowledge Management.

### **Learning Outcomes:**

At the end if the Unit, the learners will be able to

- Understand modern management techniques
- Apply Knowledge in Understanding in modern
- Analyze CRM, MRP, TQM
- Evaluate Six Sigma concept and SCM

### **Course Outcomes:**

At the end of the course, students will be able to

- Understand the concepts & principles of management and designs of organization in a practical world
- Apply the knowledge of Work-study principles & Quality Control techniques in industry
- Analyze the concepts of HRM in Recruitment, Selection and Training & Development.
- Evaluate PERT/CPM Techniques for projects of an enterprise and estimate time & cost of project & to analyze the business through SWOT.
- Create Modern technology in management science.

**TEXT BOOKS:**

1. A.R Aryasri, "Management Science", TMH, 2013
2. Stoner, Freeman, Gilbert, Management, Pearson Education, New Delhi, 2012.

**REFERENCES:**

1. Koontz & Weihrich, "Essentials of Management", 6<sup>th</sup> edition, TMH, 2005.
2. Thomas N.Duening & John M.Ivancevich, "Management Principles and Guidelines", Biztantra.
3. Kanishka Bedi, "Production and Operations Management", Oxford University Press, 2004.
4. Samuel C.Certo, "Modern Management", 9<sup>th</sup> edition, PHI, 2005

**Course Objectives :**

The objectives of this course are

- To make the student understand about the business environment
- To enable them in knowing the importance of fiscal and monetary policy
- To facilitate them in understanding the export policy of the country
- Impart knowledge about the functioning and role of WTO
- Encourage the student in knowing the structure of stock markets

**Syllabus**

**UNIT – I**

**An Overview of Business Environment** – Types of Environment - Internal & External - Micro and Macro environment - Competitive structure of industries - Environmental analysis - Scope of business - Characteristics of business - Process & limitations of environmental analysis.

**Learning Outcomes:**

After completion of this unit student will

- Understand the concept of Business environment
- Explain various types of business environment
- Know about the environmental analysis of business
- Understand the business process

**UNIT – II**

**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:**

After completion of this unit student will

- Understand the concept of public revenue and public Expenditure
- Explain the functions of RBI and its role
- Analyze the Monetary policy in India
- Know the recent trends and the role of Finance Commission in the development of our country
- Differentiate between Fiscal and Monetary Policy

### **UNIT – III**

**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:**

After completion of this unit student will

- Understand the role of Indian international trade
- Understand and explain the need for Export and EXIM Policies
- Analyze causes for Disequilibrium and correction measure
- Differentiate between Bilateral and Multilateral Trade Agreements

### **UNIT – IV**

**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:**

After completion of this unit student will

- Understand the role of WTO in trade
- Analyze Agreements on trade by WTO
- Understand the Dispute Settlement Mechanism
- Compare and contrast the Dumping and Anti-dumping Measures.

### **UNIT – V**

**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:**

After completion of this unit student will

- Understand the components of Indian financial system
- Know the structure of Money markets and Capital markets
- Analyze the Stock Markets
- Apply the knowledge in future investments
- Understand the role of SEBI in investor protection.

## **Course Outcomes:**

At the end of the course, students will be able to

- Understand various types of business environment.
- Understand the role of WTO
- Apply the knowledge of Money markets in future investment
- Analyze India's Trade Policy
- Evaluate fiscal and monetary policy
- Develop a personal synthesis and approach for identifying business opportunities

## **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. HPH 2016.

## **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.



**(19A52701d) STRATEGIC MANAGEMENT**

**Course objectives :**

The objectives of this course are

- To introduce the concepts of strategic management and understand its nature in
- competitive and organizational landscape
- To provide an understanding of internal and external analysis of a firm/individual
- To provide understanding of strategy formulation process and frame work
- Impart knowledge of Corporate culture
- Encourage the student in understanding SWOT analysis BCG Matrix

**Syllabus**

**UNIT: I**

**Introduction of Strategic Management:** meaning, nature, importance and relevance. The Strategic Management Process: – Corporate, Business and Functional Levels of strategy. Vision, mission and purpose –Business definition, objectives and goals – Stakeholders in business and their roles in strategic management. Balance scorecard.

**Learning Outcomes:**

After completion of this unit student will

- Understand the meaning and importance of strategic management
- Explain Strategic Management Process and Corporate, Business
- Know about the Business definition, objectives and goals
- Understand Stakeholders their roles in strategic management

**UNIT: II**

**External and Internal Analysis:** The Strategically relevant components of a Company's External Environment Analysis, Industry Analysis - Porter's Five Forces model – Industry driving forces – Key Success Factors. Analyzing a company's resources and competitive position

**Learning Outcomes:**

After completion of this unit student will

- Understand the components of a Company's environment

- Explain External Environment Analysis, Industry Analysis
- Know how to analyze industry competition through the Porter's Five Forces model
- Analyze Key Success Factors in a company's competitive position

### **UNIT: III**

**Competitive Strategies:** Generic Competitive Strategies: Low cost, Differentiation, Focus. Grand Strategies: Stability, Growth (Diversification Strategies, Vertical Integration Strategies, Mergers, Acquisition & Takeover Strategies, Strategic Alliances & Collaborative Partnerships), Retrenchment, Outsourcing Strategies. Tailoring strategy to fit specific industry – Life Cycle Analysis - Emerging, Growing, Mature & Declining Industries.

#### **Learning Outcomes:**

After completion of this unit student will

- Understand the Competitive Strategies
- Explain Stability, Growth Mergers, Acquisition & Takeover Strategies
- Know about the Retrenchment, Outsourcing Strategies
- Differentiate Life Cycle Analysis, Mature & Declining Industries

### **UNIT: IV**

**Strategy Implementation and control** - Strategy implementation; Organization Structure – Matching structure and strategy. Behavioral issues in implementation – Corporate culture – Mc Kinsey's 7s Framework. Functional issues – Functional plans and policies – Financial, Marketing, Operations, Personnel, IT.

#### **Learning Outcomes:**

After completion of this unit student will

- Understand the Organization Structure
- Explain Matching structure and strategy
- Know about the Corporate culture
- Analyze Functional plans and policies

### **Unit: V**

**Strategy Evaluation:** Strategy Evaluation – Operations Control and Strategic Control- Relationship between a Company's Strategy and its Business Model.- SWOT analysis – Value Chain Analysis – Benchmarking- Portfolio Analysis: BCG Matrix – GE 9 Cell Model.

#### **Learning Outcomes:**

After completion of this unit student will

- Understand the Operations Control and Strategic Control

- Explain Company's Strategy and its Business Model
- Know about the SWOT analysis
- Analyze BCG Matrix and GE 9 Cell Model

### **Course Outcomes:**

At the end of the course, students will be able to

- Understand the relevance and importance of strategic management
- Explain industry driving forces
- Analyze the competitive strategy
  
- Evaluate strategy implementation and control
- Create SWOT Analysis

### **Suggested Text Books and References**

#### **TEXT BOOKS:**

1. Arthur A. Thompson Jr., AJ Strickland III, John E Gamble, "Crafting and Executing Strategy", 18th edition, Tata McGraw Hill, 2012.
2. Subba Rao P, "Business Policy and Strategic Management" –HPH

#### **REFERENCES:**

1. Robert A. Pitts & David Lei, "Strategic Management: Building and Sustaining Competitive Advantage" 4th edition, Cengage Learning.
2. Hunger, J. David, "Essentials of Strategic Management" 5<sup>th</sup> edition, Pearson.
3. Ashwathappa, "Business Environment for Strategic Management", HPH.

(19A52701e) E-BUSINESS

**Course Objectives:**

- To provide knowledge on emerging concept on E-Business related aspect.
- To understand various electronic markets models which are trending in India
- To give detailed information about electronic payment systems net banking.
- To exact awareness on internet advertising, market research strategies and supply chain management.
- To understand about various internet protocols-security related concept.

**SYLLABUS**

**UNIT – I**

**Electronic Business:** Definition of Electronic Business - Functions of Electronic Commerce (EC) - Advantages of E-Commerce – E-Commerce and E-Business Internet Services Online Shopping-Commerce Opportunities for Industries.

**Learning Outcomes:**

After completion of this unit student will

- Understand the concept of E-Business
- Contrast and compare E-Commerce E-Business
- Analyze Advantages of E-Commerce
- Evaluate opportunities of E-commerce for industry

**UNIT – II**

**Electronic Markets and Business Models:**E-Shops-E-Malls E-Groceries - Portals - Vertical Portals-Horizontal Portals - Advantages of Portals - Business Models-Business to Business(B2B)-Business to Customers(B2C)-Business to Government(B2G)-Auctions-B2B Portals in India

**Learning Outcomes:**

After completion of this unit student will

- Understand the concept of business models
- Contrast and compare Vertical portal and Horizontal portals
- Analyze Advantages of portals
- Explain the B2B,B2C and B2G model

## UNIT – III

**Electronic Payment Systems:** Digital Payment Requirements-Designing E-payment System-Electronic Fund Transfer (EFT)-Electronic Data Interchange (EDT)-Credit Cards-Debit Cards-E-Cash-Electronic Cheques -Smart Cards-Net Banking-Digital Signature.

### Learning Outcomes:

After completion of this unit student will

- Understand the Electronic payment system
- Contrast and compare EFT and EDT
- Analyze debit card and credit card
- Explain the on Digital signature

## UNIT – IV

**E-Security:** Internet Protocols - Security on the Internet –Network and Website Security – Firewalls –Encryption – Access Control – Secure Electronic transactions.

### Learning Outcomes:

After completion of this unit student will

- Understand E-Security
- Contrast and compare security and network
- Analyze Encryption
- Evaluate electronic transitions

## UNIT – V

**E-Marketing:** Online Marketing – Advantages of Online Marketing – Internet Advertisement – Advertisement Methods – Conducting Online Online Market Research– Data mining and Marketing Research Marketing Strategy On the Web – E-Customer Relationship Management(e-CRM) –E- Supply Chain Management.(e-SCM) –New Trends in Supply Chain Management.

### Learning Outcomes:

After completion of this unit student will

- Understand the concept of online marketing
- Analyze advantages of online marketing
- Compare the e-CRM and e-SCM
- Explain the New trends in supply chain management

**Course Outcomes:**

- They will be able to identify the priority of E-Commerce in the present globalised world.
- Will be able to understand E-market-Models which are practicing by the organization
- Will be able to recognize various E-payment systems & importance of net banking.
- By knowing E-advertisement, market research strategies, they can identify the importance of customer role.
- By understanding about E-security, they can ensure better access control to secure the information.

**TEXT BOOKS:**

1. C.S.V Murthy “E-Commerce”, Himalaya publication house, 2002.
2. P.T.S Joseph, “E-Commerce” , 4<sup>th</sup> Edition, Prentice Hall of India 2011

**REFERENCES:**

1. KamalleshKBajaj,DebjaniNa, “E-Commerce”, 2<sup>nd</sup> Edition TataMcGrwHills 2005
2. Dave Chaffey – “E-Commerce E-Management”, 2<sup>nd</sup> Edition, Pearson, 2012.
3. Henry Chan, “E-Commerce Fundamentals and Application”, Raymond Lee,Tharm Wiley India 2007
4. S. Jaiswall “E-Commerce”, Galgotia Publication Pvt Ltd 2003.

**(19A05702P) SOFTWARE TESTING LAB**

Course Objectives:

This course is designed to:

- Understand the fundamentals for various testing methodologies.
- Describe the principles and procedures for designing test cases.
- Explore debugging methods.

Sample problems on testing:

1. Write programs in ‘C’ Language to demonstrate the working of the following constructs:  
i) do...while ii) while....do iii) if...else iv) switch v) for
2. “A program written in ‘C’ language for Matrix Multiplication fails” Introspect the causes for its failure and write down the possible reasons for its failure.
3. Take any system (e.g. ATM system) and study its system specifications and report the various bugs.
4. Write the test cases for any known application (e.g. Banking application)
5. Create a test plan document for any application (e.g. Library Management System)
6. Study of any testing tool (e.g. Win runner)
7. Study of any web testing tool (e.g. Selenium)
8. Study of any bug tracking tool (e.g. Bugzilla, bugbit)
9. Study of any test management tool (e.g. Test Director)
10. Study of any open source-testing tool (e.g. Test Link)
11. Take a mini project (e.g. University admission, Placement Portal) and execute it. During the Life cycle of the mini project create the various testing documents\* and final test report document.

Additional problems on testing:

1. Test the following using JUnit and CPP Unit:  
i) Sorting problems ii) Searching problems iii) Finding gcd of two integers iv) Finding factorial of a number.
2. Test web based forms using HTMLUnit.
3. Test database stored procedures using SQLUnit.  
(Use sufficient number of test cases in solving above Problems)

\*Note: To create the various testing related documents refer to the text “Effective Software Testing Methodologies by William E. Perry”

**COURSE OUTCOMES**

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

- Demonstrate the basic testing procedures.(L2)
- formulate test cases and test suites (L6)

- Make use of the Selenium and Bugzilla tools to perform testing (L3)
- Construct and test simple programs. (L6)
- Demonstrate bug tracking (L2)

**REFERENCE BOOKS:**

1. Software Testing Concepts and Tools,P.Nageswara Rao,dreamtech press.
2. Software Testing Tools,Dr.K.V.K.K.Prasad,dreamtech Press.



**(19A05701P) INTERNET OF THINGS LABORATORY**

**(Common to CSE & IT)**

**Practicals:**

1. Select any one development board (Eg., Arduino or Raspberry Pi) and control LED using the board.
2. Using the same board as in (1), read data from a sensor. Experiment with both analog and digital sensors.
3. Control any two actuators connected to the development board using Bluetooth.
4. Read data from sensor and send it to a requesting client. (using socket communication)  
Note: The client and server should be connected to same local area network.
5. Create any cloud platform account, explore IoT services and register a thing on the platform.
6. Push sensor data to cloud.
7. Control an actuator through cloud.
8. Access the data pushed from sensor to cloud and apply any data analytics or visualization services.
9. Create a mobile app to control an actuator.
10. Design an IoT based air pollution control system which monitors the air pollution by measuring carbon monoxide, ammonia, etc and gives alarm or sends message when the pollution level is more than permitted range.
11. Design an IoT based system which measures the physical and chemical properties of the water and displays the measured values.
12. Identify a problem in your local area or college which can be solved by integrating the things you learned and create a prototype to solve it (Mini Project).
13. Design a business model canvas for a digital display

**Course outcomes:**

At the end of the course, students will be able to

- Choose the sensors and actuators for an IoT application (L1)
- Select protocols for a specific IoT application (L2)
- Utilize the cloud platform and APIs for IoT application (L3)
- Experiment with embedded boards for creating IoT prototypes (L3)
- Design a solution for a given IoT application (L6)

**Text Book:**

1. Adrian McEwen, Hakim Cassimally - Designing the Internet of Things, Wiley Publications, 2012.

2. Alexander Osterwalder, and Yves Pigneur – Business Model Generation – Wiley, 2011

**Reference Books:**

1. Arshdeep Bahga, Vijay Madisetti - Internet of Things: A Hands-On Approach, Universities Press, 2014.
2. The Internet of Things, Enabling technologies and use cases – Pethuru Raj, Anupama C. Raman, CRC Press.

**Reference sites:**

<https://www.arduino.cc/>

<https://www.raspberrypi.org/>

**(19A05801a) DEV OPS**  
**(Professional Elective-IV)**

**Course Objectives:**

This course is designed to:

- Adapt the software Engineering practices that combine Software Development and IT operations for Quality Software
- Enumerate the principles of continuous development and deployment, automation of configuration management, inter-team collaboration, and IT service agility

**UNIT I**

Phases of Software Development life cycle. Values and principles of agile software development.

**Learning Outcomes:**

After completing this Unit, students will be able to:

1. Illustrate the Phases of Software Development life cycle (L2)
2. Appraise the Values and principles of agile software development (L5)

**UNIT II**

Fundamentals of DevOps: Architecture, Deployments, Orchestration, Need, Instance of applications, DevOps delivery pipeline, DevOps eco system.

**Learning Outcomes:**

After completing this Unit, students will be able to:

- Explain the Fundamentals of Software development and operations (L2)
- Create the Instance of applications (L6)

**UNIT III**

DevOps adoption in projects: Technology aspects, Agiling capabilities, Tool stack implementation, People aspect, processes

**Learning Outcomes:**

After completing this Unit, students will be able to:

- Understand the Technology aspects and Agile capabilities (L2)
- Interpret the aspects in user's context (L5)

## **UNIT IV**

CI/CD: Introduction to Continuous Integration, Continuous Delivery and Deployment , Benefits of CI/CD, Metrics to track CICD practices

### **Learning Outcomes:**

After completing this Unit, students will be able to:

- Explain CI/CD and its benefits (L2)
- Demonstrate the Continuous Integration, Delivery and Deployment (L2)

## **UNIT V**

Devops Maturity Model: Key factors of DevOps maturity model, stages of Devops maturity model, DevOps maturity Assessment

### **Learning Outcomes:**

After completing this Unit, students will be able to:

- Identify the Key factors of maturity model (L3)
- Estimate the DevOps maturity Assessment (L6)

### **Course Outcomes:**

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

- Explain how DevOps will balance the needs throughout the SDLC(L2)
- Demonstrate how DevOps improves the collaboration and productivity by automation.(L2)
- Adapt DevOps in real time projects. (L6)
- Illustrate the continuous integration tools and monitoring tools (L2)

### **Text Books:**

- 1) The DevOps Handbook: How to Create World-Class Agility, Reliability, and Security in Technology Organizations, Gene Kim , John Willis , Patrick Debois , Jez Humb,1<sup>st</sup> Edition, O'Reilly publications, 2016.
- 2) What is Devops? Infrastructure as code, 1<sup>st</sup> Edition, Mike Loukides ,O'Reilly publications, 2012.

**Reference Books:**

- 1) Building a DevOps Culture, 1st Edition, [Mandi Walls](#), O'Reilly publications, 2013.
- 2) The DevOps 2.0 Toolkit: Automating the Continuous Deployment Pipeline With Containerized Microservices, 1st Edition, [Viktor Farcic](#), CreateSpace Independent Publishing Platform publications, 2016
- 3) [Continuous Delivery](#): Reliable Software Releases Through Build, Test, and Deployment Automation, 1<sup>st</sup> Edition, [Jez Humble](#) and [David Farley](#), 2010.
- 4) Achieving DevOps: A Novel About Delivering the Best of Agile, DevOps, and microservices, 1<sup>st</sup> Edition, Dave Harrison, Knox Lively, Apress publications, 2019

**e-Resources:**

- 1) <https://www.javatpoint.com/devops>
- 2) <https://github.com/nkatre/Free-DevOps-Books-1/blob>

(19A05801b) DEEP LEARNING  
Professional Elective-IV

**Course Objectives:**

This course is designed to:

- Demonstrate the major technology trends driving Deep Learning
- Build, train and apply fully connected deep neural networks
- Implement efficient (vectorized) neural networks
- Analyze the key parameters and hyper parameters in a neural network's architecture

**UNIT I**

Linear Algebra: Scalars, Vectors, Matrices and Tensors, Matrix operations, types of matrices, Norms, Eigen decomposition, Singular Value Decomposition, Principal Components Analysis.

Probability and Information Theory: Random Variables, Probability Distributions, Marginal Probability, Conditional Probability, Expectation, Variance and Covariance, Bayes' Rule, Information Theory. Numerical Computation: Overflow and Underflow, Gradient-Based Optimization, Constrained Optimization, Linear Least Squares.

**Learning Outcomes:**

After completing this Unit, students will be able to:

- Understand linear algebra in the deep learning context (L2)
- Utilize probability and information theory in machine/deep learning applications (L3)

**UNIT II**

Machine Learning: Basics and Underfitting, Hyper parameters and Validation Sets, Estimators, Bias and Variance, Maximum Likelihood, Bayesian Statistics, Supervised and Unsupervised Learning, Stochastic Gradient Descent, Challenges Motivating Deep Learning. Deep Feedforward Networks: Learning XOR, Gradient-Based Learning, Hidden Units, Architecture Design, Back-Propagation and other Differentiation Algorithms.

**Learning Outcomes:**

After completing this Unit, students will be able to:

- Illustrate machine learning basics leads to deep learning(L2)
- Contrast super and unsupervised learning(L2)

### **UNIT III**

Regularization for Deep Learning: Parameter Norm Penalties, Norm Penalties as Constrained Optimization, Regularization and Under-Constrained Problems, Dataset Augmentation, Noise Robustness, Semi-Supervised Learning, Multi-Task Learning, Early Stopping, Parameter Tying and Parameter Sharing, Sparse Representations, Bagging and Other Ensemble Methods, Dropout, Adversarial Training, Tangent Distance, Tangent Prop and Manifold Tangent Classifier. Optimization for Training Deep Models: Pure Optimization, Challenges in Neural Network Optimization, Basic Algorithms, Parameter Initialization Strategies, Algorithms with Adaptive Learning Rates, Approximate Second-Order Methods, Optimization Strategies and Meta-Algorithms.

#### **Learning Outcomes:**

After completing this Unit, students will be able to:

- Evaluate Regularization Problems for Deep learning (L5)
- Apply optimization for Training Deep Learning models (L3)

### **UNIT IV**

Convolutional Networks: The Convolution Operation, Pooling, Convolution, Basic Convolution Functions, Structured Outputs, Data Types, Efficient Convolution Algorithms, Random or Unsupervised Features, Basis for Convolutional Networks.

#### **Learning Outcomes:**

After completing this Unit, students will be able to:

- Appraise Basic Convolution Functions (L5)
- Develop Efficient Convolution Algorithms (L3)

### **UNIT V**

Sequence Modeling: Recurrent and Recursive Nets: Unfolding Computational Graphs, Recurrent Neural Networks, Bidirectional RNNs, Encoder-Decoder Sequence-to-Sequence Architectures, Deep Recurrent Networks, Recursive Neural Networks, Echo State Networks, LSTM, Gated RNNs, Optimization for Long-Term Dependencies, Auto encoders, Deep Generative Models.

#### **Learning Outcomes:**

After completing this Unit, students will be able to:

- Illustrate Recurrent and Recursive Neural Networks (L2)
- Apply Auto encoders and Deep Generative Models (L3)

**Course Outcomes:**

After completing this course, students will be able to:

- Apply linear algebra and probability theory in the deep learning applications(L3)
- Elaborate the challenges and motivations to Deep learning (L6)
- Differentiate the architectures of deep neural network (L4)
- Build a convolutional neural network (L6)
- Build and train RNN and LSTMs(L6)

**Text Books:**

- 1) Ian Goodfellow, Yoshua Bengio, Aaron Courville, “Deep Learning”, MIT Press,2016.
- 2) Josh Patterson and Adam Gibson, “Deep learning: A practitioner's approach”, O'Reilly Media, First Edition, 2017.

**Reference Books:**

- 1) Fundamentals of Deep Learning, Designing next-generation machine intelligence algorithms, Nikhil Buduma, O'Reilly, Shroff Publishers, 2019.
- 2) Deep learning Cook Book, Practical recipes to get started Quickly, Douwe Osinga, O'Reilly, Shroff Publishers, 2019.

**e-Resources:**

- 1) <https://keras.io/datasets/>
- 2) <http://deeplearning.net/tutorial/deeplearning.pdf>
- 3) <https://arxiv.org/pdf/1404.7828v4.pdf>



**(19A05801c) AD HOC AND SENSOR NETWORKS**

Course Objectives:

This course is designed to:

- Introduce the concepts of Adhoc and Sensor Networks.
- Explain Routing algorithms suitable for Adhoc Networks.
- Understand the transport protocols for Adhoc networks
- Familiarize with the security issues of adhoc and sensor networks

**Unit I:** IEEE 802 Networking Standard. Fundamentals of WLANs, IEEE 802.11 standard. What is Wireless Internet?, Mobile IP, Cellular and Adhoc Wireless Networks, Applications of Adhoc Networks, Issues in Ad Hoc Wireless Networks, Ad Hoc Wireless Internet.

**Learning Outcomes:**

After completing this Unit, students will be able to

- Explain different wireless networks. (L2)
- Examine wireless LAN Standard IEEE 802.11.(L4)

**Unit II:** Issues in Designing a MAC Protocol for Ad Hoc Wireless Networks, Design Goals of a MAC Protocol for Ad Hoc Wireless Networks, Classification of MAC Protocols, Contention-Based Protocols, Contention-Based Protocols with Reservation Mechanisms, Contention-Based MAC Protocols with Scheduling Mechanisms, MAC Protocols that used Directional Antennas, Other MAC Protocols.

**Learning Outcomes:**

After completing this Unit, students will be able to

- Identify the limitations of existing MAC protocols when applied to adhoc networks. (L3)
- Analyze the existing MAC Protocols for Adhoc networks.(L3)

**Unit III:** Issues in Designing a Routing Protocol for Ad Hoc Wireless Networks, Classification of Routing Protocols, Table-Driven Routing Protocols, On-Demand Routing Protocols, Hybrid Routing Protocols, Hierarchical Routing Protocols, Power-Aware Routing Protocols.

**Learning Outcomes:**

After completing this Unit, students will be able to

- Compare different routing protocols.(L2)
- Choose the routing protocol based on network characteristics.(L5)

**Unit – IV** Multicast Routing in Ad hoc Wireless Networks- Issues in Designing a Multicast Routing Protocol, Operation of Multicast Routing Protocols, An architecture reference model

for multicast routing protocols, Classifications of Multicast Routing Protocols, Tree-Based Multicast Routing Protocols, Mesh-Based Multicast Routing Protocols, Summary of Tree and Mesh-Based Protocols. Issues in Designing a Transport Layer Protocol for Ad Hoc Wireless Networks, Design Goals of a Transport Layer Protocol for Ad Hoc Wireless Networks, Classification of Transport Layer Solutions. TCP over Ad Hoc Wireless Networks, Other Transport Layer Protocols for Ad Hoc Wireless Networks.

### **Learning Outcomes:**

After completing this Unit, students will be able to

- Interpret the issues in designing a multicast Routing Algorithm(L2)
- Propose new Transport protocols for adhoc networks(L6)

**Unit V:** Security in Ad Hoc Wireless Networks, Network Security Requirements, Issues and Challenges in Security Provisioning, Network Security Attacks, Key Management, Secure Routing in Ad Hoc Wireless Networks.

**Wireless Sensor Networks-** Introduction, Sensor Network Architecture, Data Dissemination, Data Gathering, MAC Protocols for Sensor Networks, Location Discovery, Quality of a Sensor Network, Evolving Standards, Other issues.

### **Learning Outcomes:**

After completing this Unit, students will be able to

- Define the sensor networks.(L1)
- Identify the need for security in Adhoc and Sensor networks.(L3)

### **Course outcomes:**

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

- List the design issues for Adhoc and sensor networks(L1)
- Analyze the use of TCP in Wireless networks.(L4)
- Justify the need for new MAC Protocols for Adhoc networks.(L5)
- Extend the existing protocols to make them suitable for Adhoc Networks.(L2)
- Evaluate the performance of Protocols in Adhoc and sensor networks.(L5)
- Design new Protocols for Adhoc and Sensor networks.(L6)

### **Text Book:**

1. Murthy, C. Siva Ram, and B. S. Manoj. Ad hoc wireless networks: Architectures and protocols. Pearson Education India, 2004.

### **References:**

1. Carlos De Morais Cordeiro, Dharma Prakash Agrawal “Ad Hoc & Sensor Networks: Theory and Applications”, World Scientific Publishing Company, 2006.
2. Feng Zhao and Leonides Guibas, "Wireless Sensor Networks", Elsevier Publication - 2002.
3. Holger Karl and Andreas Willig “Protocols and Architectures for Wireless Sensor Networks”, Wiley, 2005

**(19A01802a) DISASTER MANGEMENT**  
**OPEN ELECTIVE-IV**

**Course Objectives:**

The objective of this course is to:

- 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.

**SYLLABUS**

**UNIT-I:**

Natural Hazards And Disaster Management: Introduction of DM – Inter disciplinary -nature of the subject– Disaster Management cycle – Five priorities for action. Case study methods of the following: floods, draughts – Earthquakes – global warming, cyclones & Tsunamis – Post Tsunami hazards along the Indian coast – landslides.

**Learning Outcomes:**

After completing this Unit, students will be able to

- To know about the natural hazards and its management
- To understand about the global warming, cyclones and tsunamis

**UNIT-II:**

Man Made Disaster And Their Management Along With Case Study Methods Of The Following: Fire hazards – transport hazard dynamics – solid waste management – post disaster – bio terroristism -threat in mega cities, rail and air craft’s accidents, and Emerging infectious diseases & Aids and their management.

### **Learning Outcomes:**

After completing this Unit, students will be able to

- To know about the fire hazards and solid waste management
- To understand about the emerging infectious diseases and aids their management.

### **UNIT-III:**

Risk and Vulnerability: Building codes and land use planning – social vulnerability – environmental vulnerability – Macroeconomic management and sustainable development, climate change risk rendition – financial management of disaster – related losses.

### **Learning Outcomes:**

After completing this Unit, students will be able to

- To know about the regulations of building codes and land use planning related to risk and vulnerability.
- To understand about the financial management of disaster and related losses

### **UNIT-IV:**

Role Of Technology In Disaster Managements: Disaster management for infra structures, taxonomy of infra structure – treatment plants and process facilities-electrical substations- roads and bridges- mitigation programme for earth quakes –flowchart, geospatial information in agriculture drought assessment-multimedia technology in disaster risk management and training- transformable indigenous knowledge in disaster reduction.

### **Learning Outcomes:**

After completing this Unit, students will be able to

- To know about the technological aspects of disaster management
- To understand about the factors for disaster reduction

### **UNIT-V:**

Education and Community Preparedness: Education in disaster risk reduction-Essentials of school disaster education-Community capacity and disaster resilience-Community based disaster recovery -Community based disaster management and social capital-Designing resilience- building community capacity for action.

### **Learning Outcomes:**

After completing this Unit, students will be able to

- To impart the education related to risk reduction in schools and communities

### **Course Outcomes:**

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

- Affirm the usefulness of integrating management principles in disaster mitigation work
- Distinguish between the different approaches needed to manage pre- during and post-disaster periods
- Explain the process of risk management
- Relate to risk transfer

### **TEXT BOOKS**

1. Rajib shah & R R Krishnamurthy “Disaster Management” – Global Challenges and Local Solutions’ Universities press. (2009),
2. Tushar Bhattacharya, “Disaster Science & Management” Tata McGraw Hill Education Pvt. Ltd., New Delhi.
3. Jagbir Singh “Disaster Management” – Future Challenges and Opportunities’ I K International Publishing House Pvt. Ltd. (2007),

### **REFERENCE BOOKS**

1. Harsh. K . Gupta “Disaster Management edited”, Universities press, 2003.

**Course Objectives:**

The objective of this course is to:

- To know the basics, importance of global warming.
- To know the concepts of mitigation measures against global warming
- To know the impacts of climate changes

**UNIT I**

**EARTH'S CLIMATE SYSTEM:**

Introduction to environment, Ozone, ozone layer and its functions, Ozone depletion and ozone hole, Vienna convention and Montreal protocol, Green house gases and green house effect, Hydrological cycle and Carbon cycle, Global warming and its impacts

**Learning Outcomes:**

After completing this Unit, students will be able to

- To identify the importance of Ozone and effect of green house gases
- To know the effect of global warming

**UNIT II**

**ATMOSPHERE & ITS COMPONENTS:** Atmosphere and its layers-Characteristics of Atmosphere - Structure of Atmosphere - Composition of Atmosphere - Atmospheric stability - Temperature profile of the atmosphere - Temperature inversion and effects of inversion on pollution dispersion.

**Learning Outcomes:**

After completing this Unit, students will be able to

- To know about the layers of atmosphere and their characteristics

**UNIT III**

**IMPACTS OF CLIMATE CHANGE :** Causes of Climate change - Change of Temperature in the environment - Melting of ice and sea level rise - Impacts of Climate Change on various sectors - Projected impacts for different regions, uncertainties in the projected impacts and risk of irreversible changes.

**Learning Outcomes:**

After completing this Unit, students will be able to

- To know about the causes of climate change and its effects on various sectors.

#### **UNIT IV**

**OBSERVED CHANGES AND ITS CAUSES:** Climate change and Carbon credits-Clean Development Mechanism (CDM), CDM in India - Kyoto Protocol - Intergovernmental Panel on Climate Change (IPCC) - Climate Sensitivity - Montreal Protocol - United Nations Framework Convention on Climate Change (UNFCCC) - Global change in temperature and climate and changes within India

#### **Learning Outcomes:**

After completing this Unit, students will be able to

- To know about the causes of climate change and carbon credits, effect of change in temperature and climate on india.

#### **UNIT V**

**CLIMATE CHANGE AND MITIGATION MEASURES:** CDM and Carbon Trading - Clean Technology, biodiesel, compost, biodegradable plastics - Renewable energy usage as an alternative - Mitigation Technologies and Practices within India and around the world - Non-renewable energy supply to all sectors - Carbon sequestration - International and regional cooperation for waste disposal biomedical wastes, hazardous wastes, e-wastes, industrial wastes, etc.,

#### **Learning Outcomes:**

After completing this Unit, students will be able to

- To know about the clean technology, use of renewable energy, mitigation technologies and their practices.

#### **Course Outcomes**

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

- An ability to apply knowledge of mathematics, science, and engineering
- Design a system, component or process to meet desired needs with in realistic constraints such as economic ,environmental ,social ,political ,ethical ,health and safety , manufacturability and sustainability
- An ability to identify, formulate, and solve engineering problems

#### **REFERENCE BOOKS**

1. Dash Sushil Kumar, “Climate Change – An Indian Perspective”, Cambridge University Press India Private limited 2007.



2. Adaptation and mitigation of climate change-Scientific Technical Analysis. Cambridge University Press ,Cambridge,2006.
3. Atmospheric Science, J.M. Wallace and P.V. Hobbs, Elsevier / Academic Press 2006.
4. Jan C. van Dam, Impacts of “Climate Change and Climate Variability on Hydrological Regimes”, Cambridge university press ,2003.
5. David Archer, Global Warming: Understanding the Forecast, 2 nd ed. (Wiley, 2011
6. John Houghton, Global Warming: The Complete Briefing, 5th Edition, 2015, Cambridge Univ. Press. Useful

**Course Objectives:**

- 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**

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:**

After completing this Unit, students will be able to

- To know about basic principles of sensors and their classification
- To learn about various motion less sensors
- To understand about Piezoelectric sensor applications to detect temperature, pressure etc.
- To understand about Capacitive sensors to detect temperature, force and pressure etc.
- To know about concepts of tactile sensors, for a few applications

**UNIT-II:**

**Occupancy and Motion detectors**

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:**

After completing this Unit, students will be able to

- To know about Capacitive occupancy
- To understand about Motion detectors
- To distinguish between Potentiometric, inductive and capacitive sensors for a few applications
- To learn about a few velocity and acceleration sensors
- To know about various flow sensors

### **UNIT-III:**

#### **MEMS**

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:**

After completing this Unit, students will be able to

- To understand about the basic concept of MEMS
- To know about electrostatic actuation
- To learn about process design of MEMS based sensors
- To learn about process design of MEMS based actuators
- To distinguish between RF switches with respect to electric and magnetic sensors

### **UNIT-IV:**

#### **IoT for Smart grid**

Driving factors, Generation level, Transmission level, Distribution level, Applications, Metering and monitoring applications, Standardization and interoperability, Smart home

#### **Learning Outcomes:**

After completing this Unit, students will be able to

- To get exposure fundamental applications of IoT to Smart grid
- To learn about driving factors of IoT in Generation level
- To learn about driving factors of IoT in Transmission level
- To learn about driving factors of IoT in Distribution level
- To distinguish between metering level and monitoring applications
- To get introduced to the concept of Smart home

### **UNIT-V:**

**IoE:** 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:**

After completing this Unit, students will be able to

- To get exposed the new concept of internet of energy
- To learn about architecture of IoE
- To know about energy routines
- To learn about information sensing and processing issues
- To understand the use of energy internet as smart grid

## **Course Outcomes:**

- To get exposed to recent trends in few applications of IoT in Electrical Engineering
- To understand about usage of various types of motionless sensors
- To understand about usage of various types of motion detectors
- To get exposed to various applications of IoT in smart grid
- To get exposed to future working environment with Energy internet

## **TEXT BOOKS:**

1. Jon S. Wilson, “Sensor Technology Hand book”, Newnes Publisher, 2004
2. Tai Ran Hsu, “MEMS and Microsystems: Design and manufacture”, 1<sup>st</sup> Edition, Mc Grawhill Education, 2017
3. Ersan Kabalci and Yasin Kabalci, “From Smart grid to Internet of Energy”, 1<sup>st</sup> Edition, Academic Press, 2019

## **REFERENCE BOOKS:**

1. Raj Kumar Buyya and Amir Vahid Dastjerdi, “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, 1<sup>st</sup> Edition, CRC Press, 2019
3. RMD Sundaram Shriram, K. Vasudevan and Abhishek S. Nagarajan, “Internet of Things”, Wiley, 2019

(19A02802b) SMART ELECTRIC GRID

(OE-IV)

**Course Objectives:**

- To learn about recent trends in grids as smart grid
- To understand about smart grid architecture and technologies
- To know about smart substations
- To learn about smart transmission systems
- To learn about smart distribution systems

**UNIT-I:**

**Introduction to Smart Grid**

Working definitions of Smart Grid and Associated Concepts – Smart Grid Functions – Traditional Power Grid and Smart Grid – New Technologies for Smart Grid – Advantages – Indian Smart Grid – Key Challenges for Smart Grid

**Smart Grid Architecture:** Components and Architecture of Smart Grid Design – Review of the proposed architectures for Smart Grid. The fundamental components of Smart Grid designs – Transmission Automation – Distribution Automation – Renewable Integration

**Learning Outcomes:**

After completing this Unit, students will be able to

- To understand basic definitions and architecture of Smart grid
- To learn about new technologies for smart grid
- To know about fundamental components of smart grid
- To understand key challenges of smart grid
- To understand the need for integration of Renewable energy sources

**UNIT-II:**

**Smart grid Technologies**

Characteristics of Smart grid, Micro grids, Definitions, Drives, benefits, types of Micro grid, building blocks, Renewable energy resources, needs in smart grid, integration impact, integration standards, Load frequency control, reactive power control, case studies and test beds

**Learning Outcomes:**

After completing this Unit, students will be able to

- To know about basic characteristic features of smart grid technologies

- To understand about definition, types, building blocks of Microgrids
- To know about integration requirements, standards of renewable energy sources in Microgrids
- To understand Load frequency and reactive power control of Microgrid
- To understand about Microgrid through a case study

### **UNIT-III:**

#### **Smart Substations**

Protection, Monitoring and control devices, sensors, SCADA, Master stations, Remote terminal unit, interoperability and IEC 61850, Process level, Bay level, Station level, Benefits, role of substations in smart grid, Volt/VAR control equipment inside substation

#### **Learning Outcomes:**

After completing this Unit, students will be able to

- To know about protection, monitor and control devices in Smart substations
- To know about the importance of SCADA in substations
- To understand about interoperability and IEC 61850
- To know about role of substations in Smart grid
- To understand about Volt/VAR control equipment inside substation

### **UNIT-IV:**

#### **Smart Transmission**

Energy Management systems, History, current technology, EMS for the smart grid, Wide Area Monitoring Systems (WAMS), protection & Control (WAMPC), needs in smart grid, Role of WAMPC smart grid, Drivers and benefits, Role of transmission systems in smart grid, Synchro Phasor Measurement Units (PMUs)

#### **Learning Outcomes:**

After completing this Unit, students will be able to

- To know about Energy Management Systems in smart transmission systems
- To understand about WAMPC
- To know about role of transmission systems in Smart grid
- To know about Synchro Phasor Measurement units

### **UNIT-V:**

#### **Smart Distribution Systems**

DMS, DSCADA, trends in DSCADA and control, current and advanced DMSs, Voltage fluctuations, effect of voltage on customer load, Drivers, objectives and benefits, voltage-VAR control, VAR control equipment on distribution feeders, implementation and optimization,

FDIR - Fault Detection Isolation and Service restoration (FDIR), faults, objectives and benefits, equipment, implementation

### **Learning Outcomes:**

After completing this Unit, students will be able to

- To know about DSCADA in Smart Distribution Systems
- To distinguish between current and advanced DMSs
- To know about occurrence of voltage fluctuations
- To understand about VAR control and equipment on distribution feeders
- To know about FDIR objectives and benefits

### **Course Outcomes:**

- To be able to understand trends in Smart grids
- To understand the needs and roles of Smart substations
- To understand the needs and roles of Smart Transmission systems
- To understand the needs and roles of Smart Distribution systems
- To distinguish between SCADA and DSCADA systems in practical working environment

### **Text Books:**

1. Stuart Borlase, “Smart Grids - Infrastructure, Technology and Solutions”, 1<sup>st</sup> edition, CRC Press, 2013
2. Gil Masters, “Renewable and Efficient Electric Power System”, 2<sup>nd</sup> edition, Wiley–IEEE Press, 2013.

### **Reference Books:**

1. A.G. Phadke and J.S. Thorp, “Synchronized Phasor Measurements and their Applications”, Springer Edition, 2e, 2017.
2. T. Ackermann, “Wind Power in Power Systems”, Hoboken, NJ, USA, John Wiley, 2e, 2012.

**(19A03802a) ENERGY CONSERVATION AND MANAGEMENT**  
**OPEN ELECTIVE-IV**

**Course Objective:**

- Familiarize present energy scenario, and energy auditing methods.
- Explain components of electrical systems, lighting systems and improvements in performance.
- Demonstrate different thermal systems, efficiency analysis, and energy conservation methods.
- Train on energy conservation in major utilities.
- Instruct principles of energy management and energy pricing.

**UNIT I**

**Introduction:** Energy – Power – Past & Present Scenario Of World; National Energy Consumption Data – Environmental Aspects Associated With Energy Utilization –Energy Auditing: Need, Types, Methodology And Barriers. Role Of Energy Managers. Instruments For Energy Auditing.

**Learning Outcomes**

At the end of this unit, the student will be able to

- Infer energy consumption patterns and environmental aspects of energy utilization. (I2)
- Outline energy auditing requirements, tools and methods. (I2)
- Identify the function of energy manager. (I3)

**UNIT II**

**Electrical Systems:** Components Of EB Billing – HT And LT Supply, Transformers, Cable Sizing, Concept Of Capacitors, Power Factor Improvement, Harmonics, Electric Motors – Motor Efficiency Computation, Energy Efficient Motors, Illumination – Lux, Lumens, Types Of Lighting, Efficacy, LED Lighting And Scope Of Economy In Illumination.

**Learning Outcomes**

At the end of this unit, the student will be able to

- Outline components of electricity billing, transmission and distribution. (I2)
- Analyze performance characteristics of transformers, capacitors, and electric motors. (I4)
- Examine power factor improvements, and electric motor efficiency. (I4)
- Evaluate lighting systems. (I4)

**UNIT III**



**Thermal Systems:** Stoichiometry, Boilers, Furnaces and Thermic Fluid Heaters – Efficiency Computation and Encon Measures. Steam: Distribution & Usage: Steam Traps, Condensate Recovery, Flash Steam Utilization, Insulators & Refractories.

### **Learning Outcomes**

At the end of this unit, the student will be able to

- Determine efficiency of boilers, furnaces and other thermal systems. (15)
- Recommend energy conservation measures in thermal systems. (15)
- Justify steam systems in energy conservation. (14)

## **UNIT IV**

**Energy Conservation In Major Utilities:** Pumps, Fans, Blowers, Compressed Air Systems, Refrigeration And Air Conditioning Systems – Cooling Towers – D.G. Sets.

### **Learning Outcomes**

At the end of this unit, the student will be able to

- Explain energy conservation measures in major utilities. (12)
- Apply performance test criteria for fans, pumps, compressors, hvac systems. (13)
- Assess energy conservation in cooling towers and d.g. sets. (15)

## **UNIT V**

**Energy Management:** Principles of Energy Management, Energy demand estimation, Organising and Managing Energy Management Programs, Energy pricing.

### **Learning Outcomes**

At the end of this unit, the student will be able to

- Describe principles of energy management. (12)
- Assess energy demand and forecast. (15)
- Organize energy management programs. (16)
- Design elements of energy pricing. (16)

### **Course Outcomes:**

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

- Explain energy utilization and energy auditing methods.(12)
- Analyze electrical systems performance of electric motors and lighting systems.(14)
- Examine energy conservation methods in thermal systems.(14)
- Estimate efficiency of major utilities such as fans, pumps, compressed air systems, hvac and d.g. Sets. (14)
- Elaborate principles of energy management, programs, energy demand and energy pricing. (16)

**TEXT BOOKS:**

1. Energy Manager Training Manual (4 Volumes) Available At [www.energymanagertraining.com](http://www.energymanagertraining.com), A Website Administered By Bureau Of Energy Efficiency (BEE), A Statutory Body Under Ministry Of Power, Government Of India, 2004.

**REFERENCES:**

1. Witte. L.C., P.S. Schmidt, D.R. Brown, "Industrial Energy Management and Utilisation" Hemisphere Publ, Washington, 1988.
2. Callaghn, P.W. "Design And Management For Energy Conservation", Pergamon Press, Oxford, 1981.
3. Dryden. I.G.C., "The Efficient Use Of Energy" Butterworths, London, 1982
4. Murphy. W.R. And G. Mc KAY, "Energy Management", Butterworths, London 1987.
5. Turner, W. C., Doty, S. and Truner, W. C., "Energy Management Hand book", 7th edition, Fairmont Press, 2009.
6. De, B. K., "Energy Management audit & Conservation", 2<sup>nd</sup> Edition, Vrinda Publication, 2010.
7. Smith, C. B., "Energy Management Principles", Pergamon Press, 2007.

(19A03802b) NON-DESTRUCTIVE TESTING  
OPEN ELECTIVE-IV

**Course Objectives**

- Introduce basic concepts of non destructive testing.
- Familiarize with characteristics of ultrasonic test, transducers, rejection and effectiveness.
- Describe concept of liquid Penetrant, eddy current and magnetic particle tests, its applications and limitations.
- Explain the principles of infrared and thermal testing, applications and honey comb and sandwich structures case studies.
- Impart NDE and its applications in pressure vessels, casting and welded constructions.

**UNIT I**

**Introduction to non-destructive testing:** Radiographic test, Sources of X and Gamma Rays and their interaction with Matter, Radiographic equipment, Radiographic Techniques, Safety Aspects of Industrial Radiography.

**Learning outcomes:**

At the end of this unit, the student will be able to

- Explain non destructive testing techniques (L2)
- Summarize the basic concepts of Radiographic test ( L2)
- Outline the concepts of sources of X and Gamma Rays ( L2)
- Explain the radiographic techniques ( L2)
- Discuss the safety aspects of industrial radiography. ( L4)

**UNIT II**

**Ultrasonic test:** Principle of Wave Propagation, Reflection, Refraction, Diffraction, Mode Conversion and Attenuation, Sound Field, Piezo-electric Effect , Ultrasonic Transducers and their Characteristics, Ultrasonic Equipment and Variables Affecting Ultrasonic Test, Ultrasonic Testing, Interpretations and Guidelines for Acceptance, Rejection - Effectiveness and Limitations of Ultrasonic Testing.

**Learning outcomes:**

At the end of this unit, the student will be able to

- Explain the principle of ultrasonic test. ( L2)

- Analyze the performance of wave propagation, reflection, refraction, diffraction and sound field in ultrasonic test. (14 )
- Discuss the characteristics of ultrasonic transducers. (14)
- Outline the limitations of ultrasonic testing. (12 )

### UNIT III

**Liquid Penetrant Test:** Liquid Penetrant Test, Basic Concepts, Liquid Penetrant System, Test Procedure, Effectiveness and Limitations of Liquid Penetrant Testing.

**Eddy Current Test:** Principle of Eddy Current, Eddy Current Test System, Applications of Eddy Current-Testing Effectiveness of Eddy Current Testing.

**Magnetic Particle Test:** Magnetic Materials, Magnetization of Materials, Demagnetization of Materials, Principle of Magnetic Particle Test, Magnetic Particle Test Equipment, Magnetic Particle Test Procedure, Standardization and Calibration, Interpretation and Evaluation, Effective Applications and Limitations of the Magnetic Particle Test.

#### Learning Outcomes:

At the end of this unit, the student will be able to

- Illustrate the procedure of Liquid Penetrant, eddy current and magnetic particle tests.( L2)
- Outline the limitations of Penetrant, eddy current and magnetic particle tests. (L2 )
- Explain the effectiveness of Penetrant, eddy current and magnetic particle tests. ( L2)
- Apply the applications of Magnetic particle test. ( L3)

### UNIT IV

**Infrared And Thermal Testing:** Introduction and fundamentals to infrared and thermal testing–Heat transfer –Active and passive techniques –Lock in and pulse thermography–Contact and non contact thermal inspection methods–Heat sensitive paints –Heat sensitive papers --thermally quenched phosphors liquid crystals –techniques for applying liquid crystals –other temperature sensitive coatings –Inspection methods –Infrared radiation and infrared detectors–thermo mechanical behavior of materials–IR imaging in aerospace applications, electronic components, Honey comb and sandwich structures–Case studies.

#### Learning Outcomes:

At the end of this unit, the student will be able to

- Discuss the fundamentals of thermal testing. (16 )
- Explain the techniques of liquid crystals, active and passive. (12)
- Illustrate thermal inspection methods. ( 12)
- Outline the limitations of thermal testing. (12 )
- Explain the applications of honey comb and sandwich structures. (12)

### UNIT V

**Industrial Applications of NDE:** Span of NDE Activities Railways, Nuclear, Non-nuclear and Chemical Industries, Aircraft and Aerospace Industries, Automotive Industries, Offshore Gas and Petroleum Projects, Coal Mining Industry, NDE of pressure vessels, castings, welded constructions

### **Learning Outcomes:**

At the end of this unit, the student will be able to

- Illustrate applications of NDE. ( L2)
- Explain the applications of Railways, Nuclear and chemical industries. ( L2)
- Outline the limitations and disadvantages of NDE. (L2 )
- Explain the applications of NDA of pressure vessels, casting and welding constructions ( L2)

### **Course Outcomes**

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

- Explain various methods of non-destructive testing. (I3)
- Apply relevant non-destructive testing method different applications. (I3)
- Explain the applications of railways, nuclear and chemical industries. ( I2)
- Outline the limitations and disadvantages of nde. (I2 )
- Explain the applications of nda of pressure vessels, casting and welding constructions ( I2)

### **TEXT BOOKS:**

1. J Prasad, GCK Nair , “Non destructive test and evaluation of Materials”, Tata mcgraw-Hill Education Publishers, 2008.
2. Josef Krautkrämer, Herbert Krautkrämer, “Ultrasonic testing of materials”, 3<sup>rd</sup> edition, Springer-Verlag, 1983.
3. X. P. V. Maldague, “Non destructive evaluation of materials by infrared thermography”, 1<sup>st</sup> edition, Springer-Verlag, 1993.

### **REFERENCES:**

1. Gary L. Workman, Patrick O. Moore, Doron Kishoni, “Non-destructive, Hand Book, Ultrasonic Testing”, 3<sup>rd</sup> edition, Amer Society for Nondestructive, 2007.
2. ASTM Standards, Vol 3.01, Metals and alloys

### **Social Relevant Projects**

1. Solid waste conversion into energy (Gasification)
2. Plastic waste into fuel.
3. Bio-gas digester.
4. Development of mechanisms for farmers.
5. Smart irrigation for saving water.
6. Mechanized water segregation.

7. Applications of solar technologies for rural purpose.
8. Power generation from wind turbine.
9. Applications of drones for agriculture.
10. Solar drying.

(19A04802a) INTRODUCTION TO IMAGE PROCESSING

OPEN ELECTIVE-IV

**Course Objectives:**

- To interpret fundamental concepts of digital image processing.
- To exemplify image enhancement.
- To interpret fundamental concepts of color image processing.
- To assess image compression techniques for digital images.
- To summarize segmentation for digital images.

**UNIT-I:**

**INTRODUCTION TO DIGITAL IMAGE PROCESSING**

**Introduction:** Digital image representation, Fundamental steps in image processing, Elements of digital image processing, Elements of visual perception, Simple image model, Sampling and Quantization, Basic relationships between pixels, Image transformations.

**Applications:** Medical imaging, Robot vision, Character recognition, Remote sensing.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Understand the fundamental concepts of image processing, Sampling process and basis relationships between pixels (L1)
- Explain the elements of Digital Image Processing (L2)

**UNIT-II:**

**IMAGE ENHANCEMENT**

Need for image enhancement, Point processing, Histogram processing, Spatial filtering- Smoothing and Sharpening.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Understand the need for enhancement process (L1)
- Explain the terminology involved in enhancement process (L2)

**UNIT-III:**

**COLOR IMAGE PROCESSING**

Colour fundamentals, Colour models, Color transformations, Pseudo colour image processing, Full colour image processing.

### **Learning Outcomes:**

At the end of this unit, the student will be able to

- Understand the need for enhancement process (L1)
- Explain the terminology involved in enhancement process (L2)

### **UNIT–IV:**

#### **IMAGE COMPRESSION**

Redundancies, Fidelity criteria, Image compression model, Lossless compression: Huffman coding, Arithmetic coding. Lossy compression: Lossy Predictive Coding, JPEG Compression Standard.

### **Learning Outcomes:**

At the end of this unit, the student will be able to

- Understand the need for image compression (L1)
- Explain the image compression and various types of compression techniques (L2)

### **UNIT–V:**

#### **IMAGE SEGMENTATION**

Detection of discontinuities: point, line and edge detection, Edge linking and Boundary detections: Local Processing, Global processing via Hough transform, Thresholding, Region oriented segmentation: Region growing, Region splitting and merging.

### **Learning Outcomes:**

At the end of this unit, the student will be able to

- Understand the principle of image segmentation and its importance (L1)
- Explain the image compression and various types of compression techniques (L2)
- Analyze the various terminologies involved in image segmentation like edge, boundary detection etc. (L3)

### **Course Outcomes:**

- Interpret fundamental concepts of digital and color image processing.
- Exemplify image enhancement.
- Analyze the various terminologies involved in image segmentation like edge, boundary detection etc. Assess image compression techniques for digital images.
- Summarize segmentation techniques for digital images.



**TEXT BOOKS:**

1. Rafael C. Gonzalez and Richard E. Woods, “Digital Image Processing”, 3<sup>rd</sup> Edition, Pearson Education, 2011.

**REFERENCE BOOKS:**

1. S Jayaraman, S Esakkirajan and T Veerakumar, “Digital Image Processing”, TMH, 2011.
2. S. Sridhar, “Digital Image Processing”, 2<sup>nd</sup> Edition, Oxford Publishers, 2016.

**(19A04802b) PRINCIPLES OF CELLULAR AND MOBILE COMMUNICATIONS**  
**OPEN ELECTIVE-IV**

**Course Objectives:**

- To understand the concepts and operation of cellular systems.
- To apply the concepts of cellular systems to solve engineering problems.
- To analyse cellular systems for meaningful conclusions.
- To evaluate suitability of a cellular system in real time applications.
- To design cellular patterns based on frequency reuse factor.

**UNIT-I:**

**Introduction to Cellular Mobile Systems**

Why cellular mobile communication systems? A basic cellular system, Evolution of mobile radio communications, Performance criteria, Characteristics of mobile radio environment, Operation of cellular systems. Examples for analog and digital cellular systems.

**Learning Outcomes:**

At the end of the unit, the student should be able to

- Understand the concepts and operation of cellular systems (L1).
- Analyze the characteristics of mobile radio environment (L3).

**UNIT-II:**

**Cellular Radio System Design**

General description of the problem, Concept of frequency reuse channels, Cochannel interference reduction, Desired C/I ratio, Cell splitting and sectoring.

**Learning Outcomes:**

At the end of the unit, the student should be able to

- Understand the concept of frequency reuse and cochannel interference in cellular systems (L1).
- Apply the concept of cellular systems to solve engineering problems (L2).
- Analyze the design problems of cellular systems (L3).
- Design of cellular patterns based frequency reuse factor (L5).

### **UNIT-III:**

#### **Handoffs and Dropped Calls**

Why handoffs and types of handoffs, Initiation of handoff, Delaying a handoff, Forced handoffs, Queuing of handoffs, Power-difference handoffs, Mobile assisted handoff and soft handoff, Cell-site handoff, Intersystem handoff. Introduction to dropped call rate.

#### **Learning Outcomes:**

At the end of the unit, the student should be able to

- Understand why handoff is required (L1).
- Apply handoff techniques to solve engineering problems (L2).
- Compare various types of handoffs (L3).

### **UNIT-IV:**

#### **Multiple Access Techniques for Wireless Communications**

Introduction, Frequency Division Multiple Access, Time Division Multiple Access, Code Division Multiple Access and Space Division Multiple Access.

#### **Learning Outcomes:**

At the end of the unit, the student should be able to

- Understand various types of multiple access techniques (L1).
- Apply the concept of multiple access to solve engineering problems (L2).
- Compare various types of multiple access techniques (L3).

### **UNIT-V:**

#### **Digital Cellular Systems**

Global System for Mobile Systems, Time Division Multiple Access Systems, Code Division Multiple Access Systems. Examples for 2G, 3G and 4G systems. Introduction to 5G system.

#### **Learning Outcomes:**

At the end of the unit, the student should be able to

- Understand operation of various types of digital cellular systems (L1).
- Compare various types of digital cellular systems (L3).
- Evaluate suitability of a cellular system in real time applications (L4).

Note: The main emphasis is on qualitative treatment. Complex mathematical treatment may be avoided.

## **Course Outcomes:**

At the end of the course, the student should be able to

- Understand the concepts and operation of cellular systems (L1)
- Apply the concepts of cellular systems to solve engineering problems (L2).
- Analyse cellular systems for meaningful conclusions, Evaluate suitability of a cellular system in real time applications (L3).
- Design cellular patterns based on frequency reuse factor (L4).

## **TEXT BOOKS:**

1. William C. Y. Lee, “Mobile Cellular Telecommunications”, 2<sup>nd</sup> Edition, McGraw-Hill International, 1995.
2. Theodore S. Rappaport, “Wireless Communications – Principles and Practice”, 2<sup>nd</sup> Edition, PHI, 2004.

## **REFERENCES:**

3. Aditya K. Jagannatham “Principles of Modern Wireless Communications Systems – Theory and Practice”, McGraw-Hill International, 2015.

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## **Blooms’ Learning levels:**

L1: Remembering and Understanding

L2: Applying

L3: Analyzing, Evaluating

L4: Designing, Creating

**(19A04802c) INDUSTRIAL ELECTRONICS**  
**OPEN ELECTIVE-IV**

**Course Objectives:**

This course will enable students to:

- Describe semi-conductor devices (such as PN junction diode & Transistor) and their switching characteristics.
- Understand the characteristics of AC to DC converters.
- Understand about the practical applications Electronics in industries
- Describe the Ultrasonics and its application.

**UNIT I**

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).

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Understand the importance of Electronics and semiconductor devices in industry, operation of semiconductor devices (L1)
- Describe the working of semiconductor diodes (L1)

**UNIT II**

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- $\alpha$ , Dynamic emitter resistance, Transistor as an amplifier, Transistor construction, Lettersymbols 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.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Understand the working of Transistor and its different configurations (L1)
- Describe the working of CE, CC, CB configurations (L1)

### UNIT III

**AC to DC converters-** Introduction, Classification of Rectifiers, Half wave Rectifiers, Fullwave 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

**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 the principle of operation of Resistance welding, Induction heating and Dielectric heating (L1)
- Apply the process of Resistance welding, Induction heating and Dielectric heating in the industry (L2)

### UNIT V:

**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, Physio-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 principle of operation of Ultrasonics and its applications (L1)

- Analyze the thermal effects of Ultrasonics, soldering and welding by ultrasonics,Ultrasonic Drying in the industry (L3)

**Course Outcome:**

- Understand the semi-conductor devices and their switching characteristics.
- Apply the Ultrasonic waves with different applications
- Analyze the thermal effects of Ultrasonics, soldering and welding by ultrasonics,Ultrasonic Drying in the industry, Interpret the characteristics of AC to DC converters,
- Develop the practical applications Electronics in industries.

**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, 3<sup>rd</sup>edition, 2004.
3. G. M. Chute and R. D. Chute, “Electronics in Industry”, McGraw Hill Ltd,Tokyo, 1995.

**(19A04802d) ELECTRONIC INSTRUMENTATION**  
**OPEN ELECTIVE-IV**

**Course Objectives:**

**This course will enable students to:**

- To introduce various measuring instruments and their functionality
- To teach various measurement metrics for performance analysis
- To explain principles of operation and working of different electronic instruments
- To familiarize the characteristics, operations, calibrations and applications of the different oscilloscopes and signal generators.
- To provide exposure to different types of transducers

**UNIT – I**

**Measurement and Error:** Definitions, Accuracy, Precision, Resolution and Significant Figures, Types of Errors, Measurement error combinations. (Text 2)

**Ammeters:** DC Ammeter, Multi-range Ammeter, The Ayrton Shunt or Universal Shunt, Requirements of Shunt, Extending of Ammeter Ranges, RF Ammeter (Thermocouple), Limitations of Thermocouple. (Text 1)

**Voltmeters and Multi-meters:** Introduction, Basic Meter as a DC Voltmeter, DC Voltmeter, Multi range Voltmeter, Extending Voltmeter Ranges, Loading, AC Voltmeter using Rectifiers. True RMS Voltmeter, Multi-meter. (Text 1)

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Explain the importance of measurement system (L1)
- Examine the characteristics of different Instruments (L2)
- Illustrate different types of errors that may occur in instruments during measurements (L2)

**UNIT – II**

**Digital Voltmeters:** Introduction, RAMP technique, Dual Slope Integrating Type DVM, Integrating Type DVM, Most Commonly used principles of ADC, Successive Approximations, -Digit, Resolution and Sensitivity of Digital Meters, General Specifications of DVM, (Text 1)

**Digital Instruments:** Introduction, Digital Multi-meters, Digital Frequency Meter, Digital Measurement of Time, Universal Counter, Digital Tachometer, Digital pH Meter, Digital Phase Meter, Digital Capacitance Meter, (Text 1)

**Learning Outcomes:**



At the end of this unit, the student will be able to

- Explain working of digital measuring Instruments (L2)
- Compare the various measuring techniques for measuring voltage (L4)

### UNIT – III

**Oscilloscopes:** Introduction, Basic principles, CRT features, Block diagram of Oscilloscope, Simple CRO, Vertical Amplifier, Horizontal Deflecting System, Sweep or Time Base Generator, Measurement of Frequency by Lissajous Method, Digital Storage Oscilloscope. (Text 1)

**Signal Generators:** Introduction, Fixed and Variable AF Oscillator, Standard Signal Generator, Laboratory Type Signal Generator, AF sine and Square Wave Generator, Function Generator, (Text 1)

#### Learning Outcomes:

At the end of this unit, the student will be able to

- Describe functions of basic building of CRO (L1)
- Measure parameters viz. Amplitude, frequency and time period using CRO (L2)
- Classify signal generators and describe its characteristics (L2)

### UNIT – 4

**Measuring Instruments:** Field Strength Meter, Stroboscope, Phase Meter, Q Meter, Megger. (Text 1)

**Bridges:** Introduction, Wheatstone's bridge, Kelvin's Bridge; AC bridges, Capacitance Comparison Bridge, Inductance Comparison Bridge, Maxwell's bridge, Wien's bridge. (Text 1)

#### Learning Outcomes:

At the end of this unit, the student will be able to

- Describe function of various measuring Instruments. (L1)
- Describe how unknown capacitance and inductance can be measured using bridges (L1)
- Select appropriate bridge for measuring R, L and C parameters (L2)

### UNIT – 5

**Transducers:** Introduction, Electrical transducers, Selecting a transducer, Resistive transducer, Resistive position transducer, Strain gauges, Resistance thermometer, Thermistor, Inductive transducer, LVDT, Piezoelectric transducer, Photo cell, Photo voltaic cell, Semiconductor photo diode and transistor. (Text 1)

### **Learning Outcomes:**

At the end of this unit, the student will be able to

- Explain the importance of transducer (L1)
- Illustrate different measuring techniques in transducers to measure physical quantities.(L2)
- Select the appropriate transducer for the measurement of physical parameters (L2)

### **Course outcomes:**

- Learn different types of errors in measurement, calibration process and standards, various methods for measurement of non-electrical quantities, Understand the different methods for measurement of various electrical quantities.
- Familiarize the dynamics of instrument systems, various passive and active transducers
- Compare the various measuring techniques for measuring voltage (L4)

### **TEXT BOOKS:**

- H. S. Kalsi, “Electronic Instrumentation”, McGraw Hill, 3rd Edition, 2012, ISBN:9780070702066.
- A. D. Helfrick and W.D. Cooper, “Modern Electronic Instrumentation and Measuring Techniques”, Pearson, 1st Edition, 2015, ISBN: 9789332556065.

### **REFERENCE BOOKS:**

- David A. Bell, “Electronic Instrumentation & Measurements”, Oxford University Press PHI 2nd Edition, 2006 ISBN 81-203-2360-2.
- A. K. Sawhney, “Electronics and Electrical Measurements”, Dhanpat Rai & Sons. ISBN -81-7700-016-0

**(19A27802a) FOOD PLANT UTILITIES & SERVICES**  
**OPEN ELECTIVE - IV**

**PREAMBLE**

This subject focuses on different utilities like water, steam, electricity and its properties, production of consumption of these sources in the food plant.

**OBJECTIVES**

- To give brief idea about the utilities that are required/used in food industry and their sources and importance.

**UNIT – I**

Introduction Classification of various utilities and services in food industry. Water use in Food Processing Industry Water supply system: Pumps of different types, operational aspects, piping system for fresh water, chilled water etc., fittings and control, water requirement for cleaning and processing, water quality, water purification and softening Unit

**Learning Outcomes:**

At the end of unit, students will be able to understand the following

- Water use in Food Processing Industry
- Water supply system: Pumps of different types, operational aspects, piping system for fresh water, chilled water etc.,
- fittings and control, water requirement for cleaning and processing,
- water quality, water purification and softening Unit

**UNIT – II**

Water use in food processing: Different types of water requirements in food processing plants, types of water use, waste water sources, water wastage minimization, water loadings per unit mass of raw material. Water conservation: Water and waste water management, economic use of water, water filtration and recirculation.

**Learning Outcomes:**

At the end of unit, students will be able to understand the following

- Different types of water requirements in food processing plants,
- types of water use, waste water sources, water wastage minimization,
- water loadings per unit mass of raw material
- Water and waste water management, economic use of water,

- water filtration and recirculation

### **UNIT – III**

Steam uses in Food Industry Steam uses in food industry: Food processing operations in which steam is used, temperature, pressure and quantity of steam required in various food processing operations Steam generation system: Components of a boiler system, fuels used in boilers, energy analysis for a steam generation system, heat loss from boiler system, boiler design consideration.

#### **Learning Outcomes:**

At the end of unit, students will be able to understand the following

- Food processing operations in which steam is used
- Temperature, pressure and quantity of steam required in various food processing operations
- Components of a boiler system, fuels used in boilers, energy analysis for a steam generation system
- Heat loss from boiler system, boiler design consideration.

### **UNIT – IV**

Waste-Heat Recovery in Food Processing Facilities Quantity and quality of waste heat in food processing facilities, waste heat utilization, heat exchangers for waste heat recovery, heat pumps for waste heat recovery. Waste Disposal and its Utilization Industrial waste, sewage, influent, effluent, sludge, dissolved oxygen, biological oxygen demand, chemical oxygen demand.

#### **Learning Outcomes:**

At the end of unit, students will be able to understand the following

- Waste-heat recovery in food processing facilities
- Quantity and quality of waste heat in food processing facilities,
- Waste heat utilization, heat exchangers for waste heat recovery, heat pumps for waste heat recovery.
- Waste disposal and its utilization industrial waste, sewage, influent, effluent, sludge,
- Dissolved oxygen, biological oxygen demand, chemical oxygen demand

### **UNIT – V**

Planning and Design of Service Facilities in Food Industry Estimation of utilities requirements: Lighting, ventilation, drainage, CIP system, dust removal, fire protection etc. Maintenance of facilities: Design and installation of piping system, codes for building, electricity, boiler room, plumbing and pipe colouring, maintenance of the service facilities. Services required in offices,

laboratories, locker and toilet facilities, canteen, parking lots and roads, loading docks, garage, repair and maintenance shop, ware houses etc.

### **Learning Outcomes:**

At the end of unit, students will be able to understand the following

- Planning and Design of Service Facilities in Food Industry Estimation of utilities requirements: Lighting, ventilation, drainage, etc.
- Maintenance of facilities: Design and installation of piping system, codes for building, electricity, plumbing, maintenance of the service facilities.
- Services required in offices, laboratories, locker and toilet facilities, canteen, parking lots and roads, repair and maintenance shop, ware houses etc

### **Course Outcomes**

By end of the course, students will understand the following

- Various utilities and services used in food industry and its applications in food industry namely water, steam, electricity and etc.

### **TEXT BOOKS**

1. Lijun Wang. "Energy Efficiency and Management in Food Processing Facilities". CRC Press. 2008,
2. M. E. Casper. "Energy-saving Techniques for the Food Industry". Noyes Data Corporation. 1977,

### **REFERENCES**

1. P.L. Ballaney, "Thermal Engineering in SI Units", 23<sup>rd</sup> Edition, Khanna Publishers, Delhi, 2003.
2. C.P. Arora. "Refrigeration and Air Conditioning". 3<sup>rd</sup> Edition, Tata McGraw Hill Publishing Co. Ltd. New Delhi. 2008,
3. W. E. Whitman, "A Survey of Water Use in the Food Industry", S. D. Holdsworth. Published by British Food Manufacturing Industries Research Association.
4. Chilton's Food Engineering. 1979, Chilton Co Publishers.

**(19A27802b) NUTRACEUTICALS AND FUNCTIONAL FOODS**

**OPEN ELECTIVE – IV**

**PREAMBLE**

This course will cover the classification, brief history and the impact of nutraceuticals and functional foods on health and disease prevention. Nutraceuticals to be covered in the course include isoprenoids, isoflavones, flavanoids, carotenoids, lycopene, garlic, omega 3 fatty acids, sphingolipids, vitamin E and antioxidants, herbal products in foods. Also marketing issues related to functional foods and nutraceuticals as well as stability testing will be reviewed.

**Course Objectives:**

- To understand the interrelationship between nutraceuticals and health maintenance.
- Cite the evidence supporting the efficacy and safety of nutraceutical and functional food products
- To explain the metabolic consequences of nutraceuticals and functional foods.
- Describe the physiologic and biochemical changes associated with consumption of nutraceuticals

**UNIT – I**

Introduction, definition, Modification in the definition of nutraceuticals. Classification of nutraceuticals, Nutraceuticals market scenario, formulation considerations. Challenges for Nutraceuticals.

**Learning Outcomes:**

At the end of unit, students will be able to understand the following

- Classification of nutraceuticals,
- Nutraceuticals market scenario and formulation considerations.
- Challenges for Nutraceuticals.

**UNIT – II**

Nutraceuticals value of spices and seasoning – Turmeric, Mustard, Chilli, Cumin, Fenugreek, Black Cumin, Fennel, Asafoetida, Garlic, Ginger, Onion, Clove, Cardamom etc., Nutraceuticals from Fruits And Vegetables – Mango, Apple, Grapes, Bel, Banana, Broccoli, Tomato, Bitter Melon, Bitter Orange etc.

### **Learning Outcomes:**

At the end of unit, students will be able to understand the following

- Nutraceuticals value of spices and seasoning – Turmeric, Mustard, Chilli, Etc.
- Nutraceuticals from Fruits and Vegetables – Mango, Apple, Grapes, Tomato etc.

### **UNIT – III**

Omega -3 fatty acids from fish- Typical properties, structural formula, functional category. CLA- typical properties, structural formula, functional category. Application in Nutraceuticals. Calcium, chromium, copper, iodine, iron, magnesium, Zn- mechanism of action, bioavailability, uses and deficiency, dietary sources.

### **Learning Outcomes:**

At the end of unit, students will be able to understand the following

- Properties of Omega -3 fatty acids from fish and structures
- Application in Nutraceuticals. Calcium, iodine, iron, Zn- mechanism of action, bioavailability, uses and deficiency, dietary sources.

### **UNIT – IV**

Definition, classification – Type of classification (Probiotics, probiotics and synbiotics: Taxonomy and important features of probiotic microorganisms. Health effects of probiotics including mechanism of action. Probiotics in various foods: fermented milk products, non-milk products etc. Prebiotics. Definition, chemistry, sources, metabolism and bioavailability, effect of processing, physiological effects, effects on human health and potential applications in risk reduction of diseases, perspective for food applications for the following: Non-digestible carbohydrates/oligosaccharides: Dietary fibre, Resistant starch, Gums.

### **Learning Outcomes:**

At the end of unit, students will be able to understand the following

- Probiotics, probiotics and synbiotics: important features of probiotic microorganisms.
- Non-digestible carbohydrates/oligosaccharides: Dietary fibre and etc.

### **UNIT – V**

Phytosterol, Fatty Acids, Carotenoids, Anthocyanins, Carotenoids, Amino Acids, Water Soluble Vitamins, Free radical biology and antioxidant activity of nutraceuticals. Regulations of Nutraceuticals and Functional Foods in India and rest of the world.

### **Learning Outcomes:**

At the end of unit, students will be able to understand the following

- Phytosterol, Fatty Acids, Carotenoids, Anthocyanins, Free radical biology and antioxidant activity of nutraceuticals.
- Regulations of Nutraceuticals and Functional Foods in India and rest of the world.

### **Course Outcomes**

- Students will get know the nutraceuticals and its active components in different foods, regulations on nutraceuticals in India.

### **TEXT BOOKS**

1. “Handbook of Nutraceuticals and Functional Foods. Yashwant Pathak, Vol. 1. (Ingredients, formulations, and applications)” CRC Press 2005.
2. “Handbook of Nutraceuticals and Functional Foods”. Robert Wildman, 2<sup>nd</sup> Edition. CRC Press 2001.

### **REFERENCES**

1. B. Shrilakshmi, “Dietetics”, 5<sup>th</sup> Edition, New Age International (P) Ltd., New Delhi, 2005.
2. A. E. Bender, “Nutrition and Dietetic Foods”, Chem. Pub. Co. New York, 2<sup>nd</sup> Edition, 2004.
3. P. S. Howe, “Basic Nutrition in Health and Disease”, 2<sup>nd</sup> Edition, W. B. Saunders Company, London, 2003.
4. Kramer, “Nutraceuticals in Health and Disease Prevention”, Hoppe and Packer, Marcel Dekker, Inc., NY 2001.
5. Bao and Fenwick, “Phytochemicals in Health and Disease”, Marcel Decker, Inc. NY 2004.



**(19A54802a) MATHEMATICAL MODELING & SIMULATION**

**OPEN ELECTIVE-IV**

**Course Objective:**

This course focuses on what is needed to build simulation software environments, and not just building simulations using preexisting packages.

**UNIT-I:**

Simulation Basics-Handling Stepped and Event-based Time in Simulations-Discrete versus Continuous Modeling-Numerical Techniques-Sources and Propagation of Error

**Learning Outcomes:**

Students will be able to

- Understand computer simulation technologies and techniques.

**UNIT-II**

Dynamical, Finite State, and Complex Model Simulations-Graph or Network Transitions Based Simulations-Actor Based Simulations-Mesh Based Simulations-Hybrid Simulations

**Learning Outcomes:**

Students will be able to

- implement and test a variety of simulation and data analysis.

**UNIT-III**

Converting to Parallel and Distributed Simulations-Partitioning the Data-Partitioning the Algorithms-Handling Inter-partition Dependencies

**Learning Outcomes:**

Students will be able to

- Understand concepts of modeling layers of society's critical infrastructure networks.
- Understand partitioning the data.

**UNIT-IV**

Probability and Statistics for Simulations and Analysis-Introduction to Queues and Random Noise-Random Variates Generation-Sensitivity Analysis

**Learning Outcomes:**

Students will be able to

- Understand Queues and Random noise.
- Understand sensitivity analysis.

**UNIT-V**

Simulations Results Analysis and Viewing Tools-Display Forms: Tables, Graphs, and Multidimensional Visualization-Terminals, X and MS Windows, and Web Interfaces-Validation of Model Results

**Learning Outcomes:**

Students will be able to

- Build tools to view and control simulations and their results.

**Course Outcomes:**

After the completion of course, student will be able to

- Understand basic Model Forms.
- Understand basic Simulation Approaches.
- Evaluate handling Stepped and Event-based Time in Simulations.
- Distinguish Discrete versus Continuous Modeling.
- Apply Numerical Techniques.
- Calculate Sources and Propagation of Error.

**TEXT BOOKS:**

1. JN Kapur, "Mathematical modelling", Newage publishers
2. Kai Velten, "Mathematical Modeling and Simulation: Introduction for Scientists and Engineers" Wiley Publishers.

**(19A51802a) GREEN CHEMISTRY AND CATALYSIS FOR SUSTAINABLE ENVIRONMENT**

**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.

**Learning Outcomes:**

At the end of this unit, the students 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 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.

**Learning Outcomes:**

At the end of this unit, the students 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 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

#### **Learning Outcomes:**

At the end of this unit, the students 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 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).

#### **Learning Outcomes:**

At the end of this unit, the students 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 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

**Learning Outcomes:**

At the end of this unit, the students 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)

**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.

**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, 4<sup>th</sup> 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 Alvis Perosa and Maurizio Selva , Hand Book of Green chemistry Volume 8: Green Nanoscience, wiley-VCH, 2013.

# HONOURS

**(19A05H01) SECURE SOFTWARE ENGINEERING**  
**(Common to CSE & IT) Honors**

**Course Objectives**

The Course is designed to:

- Model and analyze the security of a software system
- Improve the security of a product, process, and project objectives.
- Perform secure coding and testing
- Apply governance and management for secure software

**UNIT I**

**Why Is Security a Software Issue?**

Introduction, The problem, Software assurance and software security, Threats to software security, Sources of software insecurity, The benefits of detecting software security defects early, Managing secure software development.

**What Makes Software Secure?**

Defining properties of secure software, How to influence the security properties of software, How to assert and specify desired security properties.

**UNIT II**

**Requirements Engineering for Secure Software**

Introduction, Misuse and Abuse Cases, The SQUARE process model: SQUARE sample outputs, Requirements elicitation, Requirements Prioritization.

**Secure Software Architecture and Design**

Introduction, Software security practices for architecture and design: Architectural risk analysis. Software security knowledge for architecture and design: Security principles, Security guidelines, and Attack patterns.

**UNIT III**

**Considerations for Secure Coding and Testing**

Introduction, Code analysis, Coding practices, Software security testing, Security testing considerations throughout the SDLC.

**Security and Complexity: System Assembly Challenges**

Introduction, Security failures, Functional and attacker perspectives for security analysis, System complexity drivers and security, Deep technical problem complexity.

**UNIT IV**

**Governance and Managing for More Secure Software**

Introduction, Governance and security, adopting an enterprise software security framework, How much security is enough?, Security and project management, maturity of practice.

## **UNIT V**

### **Security Metrics**

Defining security metrics, Diagnosing problems and measuring technical security, Analysis techniques, Organize, aggregate, and analyze data to bring out key insights.

#### **Course outcomes:**

Students will be able to:

- Identify project security risks & selecting risk management strategies. (L2)
- Describe and discuss security concerns designs at multiple levels of abstraction (L3)
- Comply with data privacy and security requirements when designing a software system. (L5)
- Design a software solution for secure access and protection of data. (L6)

#### **TEXT BOOKS**

1. Software Security Engineering: A Guide for Project Managers, by Julia H. Allen, Sean Barnum, Robert J. Ellison, Gary McGraw, Nancy R. Mead, Addison-Wesley, 1st edition, 2008.
2. Security Metrics: Replacing Fear, Uncertainty, and Doubt, by Andrew Jaquith, Addison-Wesley, 1st edition , 2007.

#### **References:**

1. Software Security: Building Security In by Gary McGraw. Addison-Wesley.
2. Software Security Engineering: A Guide for Project Managers by Julia H. Allen, Sean Barnum, Robert J. Ellison, Gary McGraw, and Nancy Mead. Addison-Wesley.



**(19A05H02) MULTI-CORE ARCHITECTURES & PROGRAMMING**  
**(Common to CSE and IT)**

**Honors**

**Course Objectives:**

The Course is designed to:

- Provide knowledge on basics of Multi-core architectures and parallel programming models.
- Design and develop parallel programs using parallel computing platforms such as OpenMP.

**UNIT – I:**

Fundamentals of SuperScalar Processor Design, Introduction to Multicore Architecture – Chip Multiprocessing, homogeneous Vs heterogeneous design - SMP – Multicore Vs Multithreading. Shared memory architectures– synchronization – Memory organization – Cache Memory – Cache Coherency Protocols - Design of Levels of Caches.

**UNIT - II**

Multicore programming Model – Shared memory model, message passing model, transaction model – OpenMP and MPI Programming. PowerPC architecture – RISC design, PowerPC ISA, PowerPC Memory Management - Power 5 Multicore architecture design, Power 6 Architecture.

**UNIT - III**

Cell Broad band engine architecture, PPE (Power Processor Element), SPE (Synergistic processing element), Cell Software Development Kit, Programming for Multicore architecture.

**UNIT - IV**

PRAM Model – PRAM Algorithms – Parallel Reduction – Prefix Sums – List Ranking – Preorder Tree Traversal – Merging Two Sorted Lists – Graph Coloring – Reducing Number of Processors – NC Class. Classifying MIMD Algorithms – Hypercube SIMD Model – Shuffle Exchange SIMD Model – 2D Mesh SIMD Model – UMA Multiprocessor Model – Broadcast – Prefix Sums. Enumeration Sort – Lower Bound on Parallel Sorting – Odd-Even Transposition Sort –Bitonic Merge – Parallel Quick Sort – Complexity of Parallel Search – Searching on Multiprocessors.

**UNIT - V**

P-Depth Search – Breadth Depth Search – Breadth First Search – Connected Components – All pair Shortest Path – Single Source Shortest Path – Minimum Cost Spanning Tree. Matrix Multiplication on 2-D Mesh, Hypercube and Shuffle Exchange SIMD Models – Algorithms for Multiprocessors – Algorithms for Multicomputers – Mapping Data to Processors.

**Course Outcomes:**

Students will be able to:

- Outline the developments in the evolution of multi-core architectures and parallel programming paradigms feature vectors for the Images. (L2)
- Compare various programming languages and libraries for parallel computing platforms.(L4)
- Make use of profiling tools to analyze the performance of applications by interpreting the given data (L3)
- Build parallel programs using OpenMP. (L3)
- Evaluate efficiency trade-offs among alternative parallel computing architectures for an efficient parallel Application design. (L5)
- Analyze performance parameters such as speed-up, efficiency for parallel programs against serial programs.(L4)

## REFERENCES

1. Hennessey and Pateterson, “Computer Architecture A Quantitative Approach”, Harcourt Asia, Morgan Kaufmann, 1999.
2. Joseph JaJa, “Introduction to Parallel Algorithms”, Addison-Wesley, 1992.
3. Kai Hwang, “Advanced Computer Architecture: Parallelism, Scalability and Programmability” McGraw-Hill, 1993.
4. Richard Y. Kain, “Advanced Computer Architecture: A System Design Approach”, PHI, 1999.
5. Rohit Chandra, Ramesh Menon, Leo Dagum, and David Kohr, “Parallel Programming in OpenMP”, Morgan Kaufmann, 2000.
6. Michael J. Quinn, “Parallel Computing: Theory & Practice”, Tata McGraw Hill Edition, 2003.
7. Ananth Grame, George Karpis, Vipin Kumar and Anshul Gupta, “Introduction to Parallel Computing”, 2nd Edition, Addison Wesley, 2003.

**(19A05H03) REINFORCEMENT LEARNING**  
**(Common to CSE and IT)**

**Course Objectives:**

The Course is designed to:

- Learn how to define RL tasks and the core principles behind the RL, including policies, value functions.
- Understand and work with tabular methods to solve classical control problems.

**UNIT - I : Introduction and Basics of RL**

Defining RL Framework, Probability Basics: Probability Axioms, Random Variables, Probability Mass Function, Probability Density Function, Cumulative Distribution Function and Expectation. Introduction to Agents, Intelligent Agents – Problem Solving – Searching, Logical Agents.

**UNIT – II: Markov Decision Process and Dynamic Programming**

Markov Property, Markov Chains, Markov Reward Process (MRP), Bellman Equations for MRP, Dynamic Programming: Policies (Evaluation, Improvement, Iteration, Value Iteration), Asynchronous Dynamic Programming, Generalized Policy Iteration, Efficiency of Dynamic Programming.

**UNIT – III : Monte Carlo Methods and Temporal Difference Learnings:**

Monte Carlo: Prediction, Estimation of Action Values, Control and Control without Exploring Starts, Off-Policy Control, Temporal Difference Prediction: TD(0), SARSA: On-Policy TD control, Q-Learning: Off-Policy TD control, Games, Afterstates, and Other Special Cases.

**UNIT – IV : Deep Reinforcement Learning:**

Deep Q-Networks, Double Deep-Q Networks (DQN, DDQN, Dueling DQN, Prioritized Experience Replay).

Policy Optimization in RL:

Introduction to Policy-based Methods, Vanilla Policy Gradient, REINFORCE Algorithm and Stochastic Policy Search, Asynchronous Actor-Critic and Asynchronous Advantage Actor-Critic (A2C, A3C), Advanced Policy Gradient (PPO, TRPO, DDPG).

**UNIT – V : Multi Agent in RL:**

Multi-Agent Learning, Meta-learning, Partially Observable Markov Decision Process, Ethics in RL, Applying RL for Real-World Problems.

**Course Outcomes:**

Students will be able to:

- Create in-code common algorithms following coding standards and libraries used in RL. (L6)
- Understand and work with approximate solutions.(L1)
- Elaborate imitation learning tasks and solutions.(L6)
- Identify current advanced techniques and applic

**Text Books :**

- 1.Richard S. Sutton and Andrew G. Barto, "Reinforcement learning: An Introduction", Second Edition, MIT Press, 2019.
- 2.Russell, Stuart J., and Peter Norvig. "Artificial intelligence: a modern approach.", Pearson Education Ltd, 2016.
- 3.Michael Wooldridge, "An Introduction to Multi Agent Systems", John Wiley, 2002.

**Reference Books :**

- 1. Ian Goodfellow, YoshuaBengio, and Aaron Courville. "Deep learning." MIT press, 2017.
- 2. Marco Wiering, Martijn van Otterlo(Ed), "Reinforcement Learning, State-of-the-Art, Adaptation, Learning, and Optimization book series, ALO, volume 12, Springer, 2012.
- 3. Keng, Wah Loon, Graesser, Laura, "Foundations of Deep Reinforcement Learning: Theory and Practice in Python", Addison Wesley Data & Analytics Series, 2020.
- 4. Francois Chollet, "Deep Learning with Python", Manning Publications, 2018.
- 5. Ragav Venkatesan, Baoxin Li, "Convolutional Neural Networks in Visual Computing", CRC Press, 2018

**(19A05H04) TRUSTED NETWORK SYSTEMS**  
**(Common to CSE & IT)**  
**Honors**

**Course Objectives:**

The Course is designed to:

- Understand the need for End to end security in wireless communication networks
- Identify the security issues in communication networks. .
- Understand the methods of securing Telephonic Network
- Familiarize with the technologies that enable the operation of trusted network systems

**UNIT-1: Certificates and Public Key Infrastructure:**

X.509 Basic Certificate fields, RSA Certification- PKI Management Model- Certificate Life Cycle, CA Trust models Encryption algorithms supported in PKI- Two models for PKI Deployment

Proactive Security - Framework Identity and Trust -Visibility - Correlation - Instrumentation and Management-Isolation and Virtualization -Anomaly Detection Zones -Network Device Virtualization -Policy Enforcement Visualization Techniques

**UNIT-2: Wireless Security**

Overview of Cisco Unified Wireless Network Architecture -Authentication and Authorization of Wireless Users - Lightweight Access Point Protocol (LWAPP) - Wireless Intrusion Prevention System Integration - Precise Location Tracking -Network Admission Control (NAC) in Wireless Networks.

**UNIT-3: IP Telephony Security**

Protecting the IP- Securing the IP Telephony Applications-Protecting Cisco Unified Call Manager Protecting Against Eavesdropping Attacks

IPv6 Security -Filtering in IPv6 -ICMP Filtering - Extension Headers in IPv6 Spoofing - Broadcast Amplification or Smurf Attacks -IPv6 Routing Security IPsec and IPv6

**UNIT-4: Data Center Security**

Protecting the Data Center Against Denial of Service (DoS) Attacks and Worms-Data Center Segmentation- Deploying Network Intrusion Detection and Prevention Systems

**UNIT-5: What's App Encryption**

Introduction -Terms -Client Registration - Initiating Session Setup -Receiving Session Setup Exchanging Messages -Transmitting Media and Other Attachments -Group Messages -Call Setup - Verifying Keys -Transport Security-Conclusion

**Course Outcomes:**

Students will be able to:

- Summarize the issues and technologies involved in designing a wireless and mobile system that is robust against various attacks (L2)
- Identify the state-of-the-art and open problems in wireless end to end security (L3)
- Outline the latest encryption techniques that enable secured communications (L2)
- Analyze the techniques and standards used to implement Secured and trusted network systems (L4)
- Categorize the attacks on the networks and analyze the methods of ensuring security (L4)

**Text Books:**

1. O. Santos and Omar Lupi Da Rosa Santos, End-to-end network security: Defense-in- depth. Indianapolis, IN: Cisco Press, 2007.
2. G. Schudel and D. J. Smith, Router security strategies: Securing IP network traffic planes. United States: Cisco Press, 2007.

**Reference Books**

1. E. A. Fisch, G. B. White, and U. W. Pooch, Secure computers and networks: Analysis, design, and implementation. Boca Raton, FL: Taylor Francis, 1999.

**(19A05H05) PARALLEL DATABASE SYSTEMS**

**(Common to CSE and IT)**

**Honors**

**Course outcomes:**

The Course is designed to:

- Introduce the need for parallelism in databases
- Teach parallel information retrieval techniques

**UNIT- I**

**Introduction-**A Brief Overview: Parallel Databases and Grid Databases, Parallel Query Processing: Motivations, Parallel Query Processing: Objectives, Forms of Parallelism, Parallel Database Architectures, Grid Database Architecture

**Analytical Models-** Cost Models, Cost Notations, Skew Model, Basic Operations in Parallel Databases

**UNIT-II**

**Parallel Search-**Search Queries, Data Partitioning, Search Algorithms

**Parallel Sort and GroupBy-**Sorting, Duplicate Removal, and Aggregate Queries, Serial External Sorting Method, Algorithms for Parallel External Sort, Parallel Algorithms for GroupBy Queries, Cost Models for Parallel Sort, Cost Models for Parallel GroupBy

**Parallel Join-**Join Operations, Serial Join Algorithms, Parallel Join Algorithms, Cost Models, Parallel Join Optimization

**UNIT-III**

**Parallel GroupBy-Join:** Groupby-Join Queries, Parallel Algorithms for Groupby-Before-Join Query Processing, Parallel Algorithms for Groupby-After-Join Query Processing, Cost Model Notations, Cost Model for Groupby-Before-Join Query Processing, Cost Model for “Groupby-After-Join” Query Processing.

**UNIT-IV**

**Parallel Indexing:** Parallel Indexing—an Internal Perspective on Parallel Indexing Structures, Parallel Indexing Structures, Index Maintenance, Index Storage Analysis, Parallel Processing of Search Queries using Index, Parallel Index Join Algorithms, Comparative Analysis.

**Parallel Query Scheduling and Optimization:** Query Execution Plan, Subqueries Execution Scheduling Strategies, Serial vs. Parallel Execution Scheduling, Scheduling Rules, Cluster Query Processing Model, Dynamic Cluster Query Optimization, Other Approaches to Dynamic Query Optimization.

**UNIT-V**

**Hash Table-**Introduction to Hash Table, Static Hashing, Dynamic Hashing.

**Transactions in Distributed and Grid Databases**-Grid Database Challenges, Distributed Database Systems and Multidatabase Systems, Basic Definitions on Transaction Management, Acid Properties of Transactions, Transaction Management in Various Database Systems, Requirements in Grid Database Systems, Concurrency Control Protocols, Atomic Commit Protocols, Replica Synchronization Protocols

**Course outcomes:**

Students will be able to:

- Identify the introductory distributed database concepts and its structures. (L2)
- Describe terms related to distributed object database design and management. (L2)
- Design transaction management and query processing techniques in DDBMS. (L5)
- Relate the importance and application of emerging database technology. (L4)

**Text Books:**

1. DAVID TANIAR, CLEMENT H.C. LEUNG WENNY RAHAYU, SUSHANT GOEL, “High-Performance Parallel Database Processing and Grid Databases”, Wiley, 2008.

**References:**

1. Principles of Distributed Database Systems, M.T. Ozsu and P. Valduriez, Prentice-Hall, 1991.
2. Distributed Database Systems, D. Bell and J. Grimson, Addison-Wesley, 1992.





# **Jawaharlal Nehru Technological University Anantapur**

*(Established by Govt. of A.P., Act. No. 30 of 2008)*

**Ananthapuramu–515 002 (A.P) India**

## **Four Year B.Tech. Course Structure and Syllabi under R20 Regulations**



**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR**  
 (Established by Govt. of A.P., ACT No.30 of 2008)  
 ANANTAPUR – 515 002 (A.P) INDIA

## Semester-0

**Induction Program: 3 weeks**  
 (Common for All Branches of 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 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	2-0-3-0
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



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ANANTAPUR – 515 002 (A.P) INDIA

**Computer Science & Engineering**  
**Course Structure (R20)**

Semester - 1 (Theory - 5, Lab - 4)					
S.No	Course No	Course Name	Category	L-T-P	Credits
1.	20A54101	Linear Algebra and Calculus	BS	3-0-0	3
2.	20A51101T	Chemistry	BS	3-0-0	3
3.	20A05201T	C-Programming & Data Structures	ES	3-0-0	3
4.	20A02101T	Basic Electrical & Electronics Engineering	ES	3-0-0	3
5.	20A03202	Engineering Workshop	LC	0-0-3	1.5
6.	20A05202	IT Workshop	LC	0-0-3	1.5
7.	20A51101P	Chemistry Lab	BS	0-0-3	1.5
8.	20A05201P	C-Programming & Data Structures Lab	ES	0-0-3	1.5
9.	20A02101P	Basic Electrical & Electronics Engineering Lab	ES	0-0-2	1.5
<b>Total</b>					<b>19.5</b>

Semester – 2 (Theory – 5, Lab – 5)					
S.No	Course No	Course Name	Category	L-T-P/D	Credits
1.	20A54202	Probability & Statistics	BS	3-0-0	3
2.	20A56201T	Applied Physics	BS	3-0-0	3
3.	20A52101T	Communicative English	HS	3-0-0	3
4.	20A05101T	Python Programming & Data Science	ES	3-0-0	3
5.	20A03101T	Engineering Drawing	ES	1-0-0/2	2
6.	20A03101P	Engineering Graphics Lab	ES	0-0-2	1
7.	20A52101P	Communicative English Lab	HS	0-0-3	1.5
8.	20A56201P	Applied Physics Lab	BS	0-0-3	1.5
9.	20A05101P	Python Programming & Data Science Lab	ES	0-0-3	1.5
<b>Total</b>					<b>19.5</b>

Semester-III							
S.No	Course Code	Course Name	Category	Hours per week			Credits
				L	T	P	
1.	20A54304	Discrete Mathematics & Graph Theory	BS	3	0	0	3
2.	20A04304T	Digital Electronics& Microprocessors	ES	3	0	0	3
3.	20A05301T	Advanced Data Structures & Algorithms	PC	3	0	0	3
4.	20A05302T	Object Oriented Programming Through Java	PC	3	0	0	3
5.	20A05303	Computer Organization	PC	3	0	0	3
6.	20A04304P	Digital Electronics& Microprocessors Lab	ES	0	0	3	1.5
7.	20A05301P	Advanced Data Structures and Algorithms Lab	PC	0	0	3	1.5
8.	20A05302P	Object Oriented Programming Through Java Lab	PC	0	0	3	1.5
9.	20A52201	Universal Human Values	MC	3	0	0	3
10.	20A05304	<b>Skill Oriented Course – I</b> Web application Development	SC	1	0	2	2
<b>Total</b>							<b>24.5</b>

Semester-IV							
S.No	Course Code	Course Name	Category	Hours per week			Credits
				L	T	P	
1.	20A54404	Deterministic & Stochastic Statistical Methods	BS	3	0	0	3
2.	20A05401T	Database Management Systems	PC	3	0	0	3
3.	20A05402T	Operating Systems	PC	3	0	0	3
4.	20A05403T	Software Engineering	PC	3	0	0	3
5.	20A52301 20A52302 20A52303	<b>Humanities Elective– I</b> Managerial Economics & Financial Analysis Organizational Behaviour Business Environment	HS	3	0	0	3
6.	20A05401P	Database Management Systems Lab	PC	0	0	3	1.5
7.	20A05402P	Operating Systems Lab	PC	0	0	3	1.5
8.	20A05403P	Software Engineering Lab	PC	0	0	3	1.5
9.	20A05404	<b>Skill Oriented Course– II</b> Exploratory Data Analysis with R	SC	1	0	2	2
10.	20A99401	<b>Mandatory non credit course</b> Design Thinking for Innovation	MC	2	1	0	0
11.	20A99301	NSS/NCC/NSO Activities	MC	0	0	2	0
<b>Total</b>							<b>21.5</b>
Community Service Internship/Project(Mandatory) for 6 weeks duration during summer vacation							

**Note:**

1. Eligible and interested students can register either for Honors or for a Minor in IV Semester as per the guidelines issued by the University
2. Students shall register for NCC/NSS/NSO activities and will be required to participate in an activity for two hours in a week during fourth semester.
3. Lateral entry students shall undergo a bridge course in Mathematics during third semester

Semester-V						
S.No.	Course Code	Course Name	L	T	P	Credits
1.	20A05501T	Computer Networks	3	0	0	3
2.	20A05502T	Artificial Intelligence	3	0	0	3
3.	20A05503	Formal Languages and Automata Theory	3	0	0	3
4.	20A05504a 20A04702b 20A05504c	<b>Professional Elective Course – I</b> Software Project Management Digital Image Processing Big Data Technologies	3	0	0	3
5.		<b>Open Elective Course – I</b>	3	0	0	3
6.	20A05501P	Computer Networks Lab	0	0	3	1.5
7.	20A05502P	Artificial Intelligence Lab	0	0	3	1.5
8.	20A05506	<b>Skill oriented course – III</b> Advanced Web Application Development	1	0	2	2
9.	20A05507	Evaluation of Community Service Project				1.5
	20A99201	<b>Mandatory noncredit course</b> Environmental Science	3	0	0	0
<b>Total</b>						<b>21.5</b>

### Open Elective-I

S.No.	Course Code	Course Name	Offered by the Dept.
1	20A01505	Building Technology	CE
2	20A02505	Electric Vehicles	EEE
3	20A03505	3D Printing Technology	ME
4	20A04507	MATLAB Programming for Engineers	ECE/EEE
5	20A04508	Introduction to Control Systems	ECE/EEE
6	20A27505	Computer Applications in Food Processing	FT
7	20A54501	Optimization Techniques	Mathematics
8	20A56501	Materials Characterization Techniques	Physics
9	20A51501	Chemistry of Energy Materials	Chemistry

### Note:

1. A student is 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 Minor from V Semester onwards.
2. 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.
3. A student is permitted to select a Minor program only if the institution is already offering a Major degree program in that discipline

<b>Semester-VI</b>						
<b>S.No</b>	<b>Course Code</b>	<b>Course Name</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>Credits</b>
1.	20A05601T	Compiler Design	3	0	0	3
2.	20A05602T	Machine Learning	3	0	0	3
3.	20A05603T	Internet of Things	3	0	0	3
4.	20A05604a 20A05604b 20A05604c	<b>Professional Elective Course- II</b> Software Testing Advanced Computer Architecture Computer Vision	3	0	0	3
5.		<b>Open Elective Course - II</b>	3	0	0	3
6.	20A05601P	Compiler Design Lab	0	0	3	1.5
7.	20A05602P	Machine Learning Lab	0	0	3	1.5
8.	20A05603P	Internet of Things Lab	0	0	3	1.5
9.	20A52401	<b>Skill oriented course - IV</b> Soft Skills	1	0	2	2
10.	20A99601	<b>Mandatory Non-credit Course</b> Intellectual Property Rights & Patents	2	0	0	0
<b>Total</b>						<b>21.5</b>
Industry Internship (Mandatory) for 6 – 8 weeks duration during summer vacation						

**Open Elective-II**

<b>S.No</b>	<b>Course Code</b>	<b>Course Name</b>	<b>Offered by the Dept.</b>
1	20A01605	Environmental Economics	CE
2	20A02605	Smart Electric Grid	EEE
3	20A03605	Introduction to Robotics	ME
4	20A04605	Signal Processing	ECE
5	20A04606	Basic VLSI Design	ECE
6	20A27605	Food Refrigeration and Cold Chain Management	FT
7	20A54701	Wavelet Transforms & its applications	Mathematics
8	20A56701	Physics Of Electronic Materials and Devices	Physics
9	20A51701	Chemistry of Polymers and its Applications	Chemistry

<b>Semester-VII</b>						
<b>S.No.</b>	<b>Course Code</b>	<b>Course Name</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>Credits</b>
<b>1.</b>	20A05701a 20A05701b 20A05701c	<b>Professional Elective Course– III</b> Cloud Computing Agile Methodologies Vehicular Adhoc Networks	3	0	0	3
<b>2.</b>	20A05702a 20A05702b 20A05702c	<b>Professional Elective Course– IV</b> Fundamentals of AR/VR Cryptography & Network Security Natural Language Processing	3	0	0	3
<b>3.</b>	20A05703a 20A05703b 20A05703c	<b>Professional Elective Course– V</b> Full Stack Development Block chain Technology and Applications Deep Learning	3	0	0	3
<b>4.</b>	20A52701a 20A52701b 20A52701c	<b>Humanities Elective – II</b> Entrepreneurship and Incubation Management Science Enterprise Resource Planning	3	0	0	3
<b>5.</b>		<b>Open Elective Course – III</b>	3	0	0	3
<b>6.</b>		<b>Open Elective Course – IV</b>	3	0	0	3
<b>7.</b>	20A05706	<b>Skill oriented course – V</b> Mobile Application Development	1	0	2	2
<b>8.</b>	20A05707	Evaluation of Industry Internship				3
<b>Total</b>						<b>23</b>

**Open Elective-III**

<b>S.No.</b>	<b>Course Code</b>	<b>Course Name</b>	<b>Offered by the Dept.</b>
1	20A01704	Cost Effective Housing Techniques	CE
2	20A02704	IOT Applications in Electrical Engineering	EEE
3	20A03704	Product Design & Development	ME
4	20A04704	Electronic Sensors	ECE
5	20A04506	Principles of Communication Systems	ECE
6	20A27704	Human Nutrition	FT
7	20A54702	Numerical Methods for Engineers	Mathematics
8	20A56702	Sensors And Actuators for Engineering Applications	Physics
9	20A51702	Chemistry of Nanomaterials and Applications	Chemistry

**Open Elective-IV**

<b>S.No.</b>	<b>Course Code</b>	<b>Course Name</b>	<b>Offered by the Dept.</b>
1	20A01705	Health, Safety & Environmental Management	CE
2	20A02705	Renewable Energy Systems	EEE
3	20A03705	Introduction to Composite Materials	ME
4	20A04705	Microcontrollers and Applications	ECE
5	20A04706	Principles of Cellular & Mobile Communications	ECE
6	20A27705	Waste and Effluent Management	FT
7	20A54703	Number theory & its applications	Mathematics
8	20A56703	Smart Materials and Devices	Physics
9	20A51703	Green Chemistry and Catalysis for Sustainable Environment	Chemistry

Semester-VIII							
S.No.	Course Code	Course Name	Category	L	T	P	Credits
1.	20A05801	Full Internship & Project work	PR				12
<b>Total</b>							<b>12</b>

### COURSES OFFERED FOR HONOURS DEGREE IN CSE

S.No.	Code	Course Name	Contact Hours per week		Credits
			L	T	
1	20A05H01	Privacy preserving and Data Publishing	4	0	4
2	20A05H02	NoSQL Databases	4	0	4
3	20A05H03	Software Defined Data Center	4	0	4
4	20A05H04	Robotics and Intelligent Systems	4	0	4
5	20A05H05	MOOC - 1			2
6	20A05H05	MOOC - 2			2

#### Suggested MOOCs:

1. Multi-Core Computer Architecture – Storage and Interconnects
2. User-centric Computing for Human-Computer Interaction
3. GPU Architectures and Programming
4. Introduction to Quantum Computing
5. Real Time Operating Systems

### LIST OF MINORS OFFERED TO CSE

S.No.	Minor Title	Department offering the Minor
1.	Construction Technology	Civil Engineering
2.	Environmental Geotechnology	Civil Engineering
3.	Energy Systems	EEE
4.	3D Printing	ME
5.	Industrial Engineering	ME
6.	Food Science	Food Technology

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**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR**  
**B.Tech -CSE – I Sem**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

**(20A54101) LINEAR ALGEBRA & CALCULUS**  
 (Common to All Branches of Engineering)

**Course Objectives:**

- This course will illuminate the students in the concepts of calculus and linear algebra.
- 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.

**UNIT -1**

**Matrices**

Rank of a matrix by echelon form, normal form. Solving system of homogeneous and non-homogeneous equations linear equations. Eigen values and Eigenvectors and their properties, Cayley-Hamilton theorem (without proof), finding inverse and power of a matrix by Cayley-Hamilton theorem, diagonalisation of a matrix.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Solving systems of linear equations, using technology to facilitate row reduction determine the rank, eigen values and eigenvectors (L3).
- Identify special properties of a matrix, such as positive definite, etc., and use this information to facilitate the calculation of matrix characteristics; (L3)

**UNIT -2**

**Mean Value Theorems**

Rolle's Theorem, Lagrange's mean value theorem, Cauchy's mean value theorem, Taylor's and Maclaurin theorems with remainders (without proof) related problems.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Translate the given function as series of Taylor's and Maclaurin's with remainders (L3)
- Analyze the behaviour of functions by using mean value theorems (L3)

**UNIT -3**

**Multivariable Calculus**

Partial derivatives, total derivatives, chain rule, change of variables, Jacobians, maxima and minima of functions of two variables, method of Lagrange multipliers.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Find partial derivatives numerically and symbolically and use them to analyze and interpret the way a function varies. (L3)
- Acquire the Knowledge maxima and minima of functions of several variable (L1)
- Utilize Jacobian of a coordinate transformation to deal with the problems in change of variables (L3)

**UNIT -4****Multiple Integrals**

Double integrals, change of order of integration, change of variables. Evaluation of triple integrals, change of variables between Cartesian, cylindrical and spherical polar co-ordinates. Finding areas and volumes using double and triple integrals.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Evaluate double integrals of functions of several variables in two dimensions using Cartesian and polar coordinates (L5)
- Apply double integration techniques in evaluating areas bounded by region (L4)
- Evaluate multiple integrals in Cartesian, cylindrical and spherical geometries (L5)

**UNIT -5****Beta and Gamma functions**

Beta and Gamma functions and their properties, relation between beta and gamma functions, evaluation of definite integrals using beta and gamma functions.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Understand beta and gamma functions and its relations (L2)
- Conclude the use of special function in evaluating definite integrals (L4)

**Text Books:**

1. B. S. Grewal, Higher Engineering Mathematics, 44/e, Khanna Publishers, 2017.
2. Erwin Kreyszig, Advanced Engineering Mathematics, 10/e, John Wiley & Sons, 2011.

**Reference Books:**

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, 2011.
4. Micheael Greenberg, Advanced Engineering Mathematics, 9<sup>th</sup> edition, Pearson edn
5. Dean G. Duffy, Advanced Engineering Mathematics with MATLAB, CRC Press
6. Peter O'neil, Advanced Engineering Mathematics, Cengage Learning.
7. R.L. Garg Nishu Gupta, Engineering Mathematics Volumes-I &II, Pearson Education
8. B. V. Ramana, Higher Engineering Mathematics, McGraw Hill Education

9. H. k Das, Er. RajnishVerma, Higher Engineering Mathematics, S. Chand.
10. N. Bali, M. Goyal, C. Watkins, Advanced Engineering Mathematics, Infinity Science Press.

**Course Outcomes:**

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

- Develop the use of matrix algebra techniques that is needed by engineers for practical applications (L6)
- Utilize mean value theorems to real life problems (L3)
- Familiarize with functions of several variables which is useful in optimization (L3)
- Students will also learn important tools of calculus in higher dimensions. Students will become familiar with 2- dimensional coordinate systems (L5)
- Students will become familiar with 3- dimensional coordinate systems and also learn the utilization of special functions

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR**  
**B.Tech-CSE – I Sem**

**L T P C**  
**3 0 0 3**

**(20A51101T) CHEMISTRY**

(CSE, AI & DS, CSE (AI), CSE(IoT), CSE (Data Science), CSE(AI & ML), IT, ECE, EEE and IT)

**Course Objectives:**

- To familiarize engineering chemistry and its applications
- To train the students on the principles and applications of electrochemistry and polymers
- To introduce instrumental methods, molecular machines and switches

**Unit 1: Structure and Bonding Models:**

Planck's quantum theory, dual nature of matter, Schrodinger equation, significance of  $\Psi$  and  $\Psi^2$ , applications to hydrogen, molecular orbital theory – bonding in homo- and heteronuclear diatomic molecules – energy level diagrams of  $O_2$  and  $CO$ , etc.  $\pi$ -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)
- 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:**

Coordination compounds: Crystal field theory – salient features – splitting in octahedral and tetrahedral geometry. Properties of coordination compounds-Oxidation state, coordination, magnetic and colour.

Semiconductor materials, super conductors- basic concept, band diagrams for conductors, semiconductors and insulators, Effect of doping on band structures.

Supercapacitors: Introduction, Basic concept-Classification – Applications.

Nanochemistry: Introduction, classification of nanomaterials, properties and applications of Fullerenes, carbon nano tubes and Graphenes nanoparticles.

**Learning Outcomes:**

At the end of this unit, the students will be able to

- Explain splitting in octahedral and tetrahedral geometry of complexes (L2).
- 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 Graphenes nanoparticles (L2).

**Unit 3: Electrochemistry and Applications:**

Electrodes – concepts, reference electrodes (Calomel electrode,  $Ag/AgCl$  electrode and glass electrode); Electrochemical cell, Nernst equation, cell potential calculations and numerical problems,

potentiometry- potentiometric titrations (redox titrations), concept of conductivity, conductivity cell, conductometric titrations (acid-base titrations).

Electrochemical sensors – potentiometric sensors with examples, amperometric sensors with examples.

Primary cells – Zinc-air battery, Secondary cells – Nickel-Cadmium (NiCad), and lithium ion batteries- working of the batteries including cell reactions; Fuel cells, hydrogen-oxygen, methanol fuel cells – working of the cells.

### **Learning Outcomes:**

At the end of this unit, the students will be able to

- Apply Nernst equation for calculating electrode and cell potentials (L3)
- Differentiate between pH metry, potentiometric and conductometric titrations (L2)
- Explain the theory of construction of battery and fuel cells (L2)
- Solve problems based on cell potential (L3)

### **Unit 4: Polymer Chemistry:**

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.

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)
- 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**

Electromagnetic spectrum. Absorption of radiation: Beer-Lambert's law. Principle and applications of pH metry, UV-Visible, IR Spectroscopies. Solid-Liquid Chromatography–TLC, retention time.

### **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 different analytical instruments (L2)
- Explain the different applications of analytical instruments (L2)

**Text Books:**

1. Jain and Jain, Engineering Chemistry, 16/e, DhanpatRai, 2013.
2. Peter Atkins, Julio de Paula and James Keeler, Atkins' Physical Chemistry, 10/e, Oxford University Press, 2010.

**Reference Books:**

1. G.V.Subba Reddy, K.N.Jayaveera and C. Ramachandraiah, Engineering Chemistry, Mc Graw Hill, 2020.
2. D. Lee, Concise Inorganic Chemistry, 5/e, Oxford University Press, 2008.
3. Skoog and West, Principles of Instrumental Analysis, 6/e, Thomson, 2007.
4. J.M.Lehn, Supra Molecular Chemistry, VCH Publications

**Course Outcomes:**

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

- Compare the materials of construction for battery and electrochemical sensors (I2)
- Explain the preparation, properties, and applications of thermoplastics &thermosetting, elastomers& conducting polymers. (I2)
- Explain the principles of spectrometry, slc in separation of solid and liquid mixtures (I2)
- Apply the principle of Band diagrams in application of conductors and semiconductors (L3)

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR****B.Tech -CSE – I Sem**

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**(20A05201T) C-PROGRAMMING & DATA STRUCTURES**

(Common to All Branches of Engineering)

**Course Objectives:**

- To illustrate the basic concepts of C programming language.
- To discuss the concepts of Functions, Arrays, Pointers and Structures.
- To familiarize with Stack, Queue and Linked lists data structures.
- To explain the concepts of non-linear data structures like graphs and trees.
- To learn different types of searching and sorting techniques.

**UNIT-1**

**Introduction to C Language** - C language elements, variable declarations and data types, operators and expressions, decision statements - If and switch statements, loop control statements - while, for, do-while statements, arrays.

**Learning outcomes:**

At the end of this unit, the students will be able to

- Use C basic concepts to write simple C programs. (L3)
- Use iterative statements for writing the C programs (L3)
- Use arrays to process multiple homogeneous data. (L3)
- Test and execute the programs and correct syntax and logical errors. (L4)
- Translate algorithms into programs. (L4)
- Implement conditional branching, iteration and recursion. (L2)

**UNIT – 2**

Functions, types of functions, Recursion and argument passing, pointers, storage allocation, pointers to functions, expressions involving pointers, Storage classes – auto, register, static, extern, Structures, Unions, Strings, string handling functions, and Command line arguments.

**Learning outcomes:**

At the end of this unit, the students will be able to

- Writing structured programs using C Functions. (L5)
- Writing C programs using various storage classes to control variable access. (L5)
- Apply String handling functions and pointers. (L3)
- Use arrays, pointers and structures to formulate algorithms and write programs.(L3)

**UNIT-3**

**Data Structures**, Overview of data structures, stacks and queues, representation of a stack, stack related terms, operations on a stack, implementation of a stack, evaluation of arithmetic expressions, infix, prefix, and postfix notations, evaluation of postfix expression, conversion of expression from infix to postfix, recursion, queues - various positions of queue, representation of queue, insertion, deletion, searching operations.

**Learning outcomes:**

At the end of this unit, the students will be able to

- Describe the operations of Stack. (L2)
- Explain the different notations of arithmetic expression. (L5)
- Develop various operations on Queues. (L6)

**UNIT – 4**

**Linked Lists** – Singly linked list, dynamically linked stacks and queues, polynomials using singly linked lists, using circularly linked lists, insertion, deletion and searching operations, doubly linked lists and its operations, circular linked lists and its operations.

**Learning outcomes:**

At the end of this unit, the students will be able to

- Analyze various operations on singly linked list. (L4)
- Interpret operations of doubly linked lists. (L2)
- Apply various operations on Circular linked lists. (L6)

**UNIT-5**

**Trees** - Tree terminology, representation, Binary trees, representation, binary tree traversals. binary tree operations, **Graphs** - graph terminology, graph representation, elementary graph operations, Breadth First Search (BFS) and Depth First Search (DFS), connected components, spanning trees. **Searching and Sorting** – sequential search, binary search, exchange (bubble) sort, selection sort, insertion sort.

**Learning outcomes:**

At the end of this unit, the students will be able to

- Develop the representation of Tress. (L3)
- Identify the various Binary tree traversals. (L3)
- Illustrate different Graph traversals like BFS and DFS. (L2)
- Design the different sorting techniques (L6)
- Apply programming to solve searching and sorting problems. (L3)



**Text Books:**

1. The C Programming Language, Brian W Kernighan and Dennis M Ritchie, Second Edition, Prentice Hall Publication.
2. Fundamentals of Data Structures in C, Ellis Horowitz, SartajSahni, Susan Anderson-Freed, Computer Science Press.
3. Programming in C and Data Structures, J.R.Hanly, Ashok N. Kamthane and A. AnandaRao, Pearson Education.
4. B.A. Forouzon and R.F. Gilberg, "COMPUTER SCIENCE: A Structured Programming Approach Using C", Third edition, CENGAGE Learning, 2016.
5. Richard F. Gilberg & Behrouz A. Forouzan, "Data Structures: A Pseudocode Approach with C", Second Edition, CENGAGE Learning, 2011.

**Reference Books:**

1. Pradip Dey and Manas Ghosh, Programming in C, Oxford University Press, 2nd Edition 2011.
2. E. Balaguruswamy, "C and Data Structures", 4<sup>th</sup> Edition, Tata Mc Graw Hill.
3. A.K. Sharma, Computer Fundamentals and Programming in C, 2nd Edition, University Press.
4. M.T. Somashekara, "Problem Solving Using C", PHI, 2<sup>nd</sup> Edition 2009.

**Course Outcomes:**

1. Analyse the basic concepts of C Programming language. (L4)
2. Design applications in C, using functions, arrays, pointers and structures. (L6)
3. Apply the concepts of Stacks and Queues in solving the problems. (L3)
4. Explore various operations on Linked lists. (L5)
5. Demonstrate various tree traversals and graph traversal techniques. (L2)
6. Design searching and sorting methods (L3)

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR**

**B.Tech -CSE – I Sem**

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**(20A02101T) BASIC ELECTRICAL & ELECTRONICS ENGINEERING**

(Civil, Mechanical, CSE, AI & DS, CSE (AI), CSE(IoT), CSE (Data Science), CSE(AI & ML), IT and Food Technology)

**Part A: Basic Electrical Engineering**

**Course Objectives:**

- To introduce basics of electric circuits.
- To teach DC and AC electrical circuit analysis.
- To explain working principles of transformers and electrical machines.
- To impart knowledge on Power system generation, transmission and distribution

**UNIT -1**

**DC & AC Circuits:**

Electrical circuit elements (R - L and C) - Kirchhoff laws - Series and parallel connection of resistances with DC excitation. Superposition Theorem - Representation of sinusoidal waveforms - peak and rms values - phasor representation - real power - reactive power - apparent power - power factor - Analysis of single-phase ac circuits consisting of RL - RC - RLC series circuits, Resonance.

**Learning Outcomes**

At the end of this unit, the student will be able to

- Recall Kirchoff laws
- Analyze simple electric circuits with DC excitation
- Apply network theorems to simple circuits
- Analyze single phase AC circuits consisting of series RL - RC - RLC combinations

**UNIT -2**

**DC & AC Machines:**

Principle and operation of DC Generator - EMF equations - OCC characteristics of DC generator – principle and operation of DC Motor – Performance Characteristics of DC Motor - Speed control of DC Motor – Principle and operation of Single Phase Transformer - OC and SC tests on transformer - Principle and operation of 3-phase AC machines [ Elementary treatment only ]

**Learning Outcomes**

At the end of this unit, the student will be able to

- Explain principle and operation of DC Generator & Motor.
- Perform speed control of DC Motor
- Explain operation of transformer and induction motor.
- Explain construction & working of induction motor - DC motor

## UNIT -3

### Basics of Power Systems:

Layout & operation of Hydro, Thermal, Nuclear Stations - Solar & wind generating stations – Typical AC Power Supply scheme – Elements of Transmission line – Types of Distribution systems: Primary & Secondary distribution systems.

### Learning Outcomes

At the end of this unit, the student will be able to

- Understand working operation of various generating stations
- Explain the types of Transmission and Distribution systems

### Text Books:

1. D. P. Kothari and I. J. Nagrath - “Basic Electrical Engineering” - Tata McGraw Hill - 2010.
2. V.K. Mehta & Rohit Mehta, “Principles of Power System” – S.Chand – 2018.

### References:

1. L. S. Bobrow - “Fundamentals of Electrical Engineering” - Oxford University Press - 2011.
2. E. Hughes - “Electrical and Electronics Technology” - Pearson - 2010.
3. C.L. Wadhwa – “Generation Distribution and Utilization of Electrical Energy”, 3rd Edition, New Age International Publications.

### Course Outcomes:

The student should be able to

- Apply concepts of KVL/KCL in solving DC circuits
- Understand and choose correct rating of a transformer for a specific application
- Illustrate working principles of DC Motor
- Identify type of electrical machine based on their operation
- Understand the basics of Power generation, Transmission and Distribution

## Part ‘B’- Electronics Engineering

### COURSE OBJECTIVES

- Understand principles and terminology of electronics.
- Familiar with the theory, construction, and operation of electronic devices.
- Learn about biasing of BJTs and FETs.
- Design and construct amplifiers.
- Understand the concept & principles of logic devices.

### Unit-1:

**Diodes and Applications:** Semiconductor Diode, Diode as a Switch & Rectifier, Half Wave and Full Wave Rectifiers with and without Filters; Operation and Applications of Zener Diode, LED, Photo Diode.

**Transistor Characteristics:** Bipolar Junction Transistor (BJT) – Construction, Operation, Amplifying Action, Common Base, Common Emitter and Common Collector Configurations, Operating Point, Biasing of Transistor Configuration; Field Effect Transistor (FET) – Construction, Characteristics of Junction FET, Concepts of Small Signal Amplifiers –CE & CC Amplifiers.

**Learning outcomes:**

At the end of this unit, the student will be able to

- Remember and understand the basic characteristics of semiconductor diode. (L1)
- Understand principle of operation of Zener diode and other special semiconductor diodes. (L1)
- Analyze BJT based biasing circuits. (L3)
- Design an amplifier using BJT based on the given specifications. (L4)

**Unit-2:**

**Operational Amplifiers and Applications:** Introduction to Op-Amp, Differential Amplifier Configurations, CMRR, PSRR, Slew Rate; Block Diagram, Pin Configuration of 741 Op-Amp, Characteristics of Ideal Op-Amp, Concept of Virtual Ground; Op-Amp Applications - Inverting, Non-Inverting, Summing and Difference Amplifiers, Voltage Follower, Comparator, Differentiator, Integrator.

**Learning outcomes:**

At the end of this unit, the student will be able to

- Describe operation of Op-Amp based linear application circuits, converters, amplifiers and non-linear circuits. (L2)
- Analyze Op-Amp based comparator, differentiator and integrator circuits. (L3)

**Unit-3:**

**Digital Electronics:** Logic Gates, Simple combinational circuits – Half and Full Adders, BCD Adder. Latches and Flip-Flops (S-R, JK and D), Shift Registers and Counters. Introduction to Microcontrollers and their applications (Block diagram approach only).

**Learning outcomes:**

At the end of this unit, the student will be able to

- Explain the functionality of logic gates. (L2)
- Apply basic laws and De Morgan's theorems to simplify Boolean expressions. (L3)
- Analyze standard combinational and sequential circuits. (L4)
- Distinguish between 8085 & 8086 microprocessors also summarize features of a microprocessor. (L5)

**Text Books:**

1. R.L. Boylestad & Louis Nashlesky, Electronic Devices & Circuit Theory, Pearson Education, 2007.
2. Ramakanth A. Gayakwad, Op-Amps & Linear ICs, 4<sup>th</sup> Edition, Pearson, 2017.

3. R. P. Jain, Modern Digital Electronics, 3<sup>rd</sup> Edition, Tata Mcgraw Hill, 2003.
4. Raj Kamal, Microcontrollers: Architecture, Programming, Interfacing and System Design, 2<sup>nd</sup> Edition, Pearson, 2012.

**Reference Books:**

1. SantiramKal, Basic Electronics- Devices, Circuits and IT Fundamentals, Prentice Hall, India, 2002.
2. R. S. Sedha, A Text Book of Electronic Devices and Circuits, S.Chand & Co, 2010.
3. R. T. Paynter, Introductory Electronic Devices & Circuits – Conventional Flow Version, Pearson Education, 2009.

**COURSE OUTCOMES:**

After the completion of the course students will be able to

- Explain the theory, construction, and operation of electronic devices.
- Apply the concept of science and mathematics to explain the working of diodes and its applications, working of transistor and to solve the simple problems based on the applications
- Analyze small signal amplifier circuits to find the amplifier parameters
- Design small signal amplifiers using proper biasing circuits to fix up proper Q point.
- Distinguish features of different active devices including Microprocessors.

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**B.Tech-CSE– I Sem**

**L T P C**  
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**(20A03202) ENGINEERING WORKSHOP**  
(Common to All Branches of Engineering)

**Course Objective:**

To familiarize students with wood working, sheet metal operations, fitting and electrical house wiring skills

**List of Topics**

**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

**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

**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

**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

**Course Outcomes:**

After completion of this lab the student will be able to

- Apply wood working skills in real world applications. (13)
- Build different objects with metal sheets in real world applications. (13)
- Apply fitting operations in various applications. (13)
- Apply different types of basic electric circuit connections. (13)
- Use soldering and brazing techniques. (12)

**Note: In each section a minimum of three exercises are to be carried out.**

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**(20A05202) IT WORKSHOP**

(Common to All Branches of Engineering)

**Course Objectives:**

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

**Preparing your Computer**

**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

**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**

**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. Crimping 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, and 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****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, Image Manipulation tools.

**Task 9:**

**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.

**Task 10:**

**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

**Task 11:**

**LateX:** Introduction to Latex and its installation and different IDEs. Creating first document using Latex, using content into sections using article and book class of LaTeX. Styling Pages: reviewing and customizing different paper sizes and formats. Formatting text (styles, size, alignment, colors and adding bullets and numbered items, inserting mathematical symbols, and images, etc.). Creating basic



tables, adding simple and dashed borders, merging rows and columns. Referencing and Indexing: cross-referencing (refer to sections, table, images), bibliography (references).

**References:**

1. Introduction to Computers, Peter Norton, McGraw Hill
2. MOS study guide for word, Excel, Powerpoint & Outlook Exams, Joan Lambert, Joyce Cox, PHI.
3. Introduction to Information Technology, ITL Education Solutions limited, Pearson Education.
4. Networking your computers and devices, Rusen, PHI
5. Trouble shooting, Maintaining & Repairing PCs, Bigelows, TMH
6. Lamport L. LATEX: a document preparation system: user's guide and reference manual. Addison-wesley; 1994.

**Course Outcomes:**

- Disassemble and Assemble a Personal Computer and prepare the computer ready to use.
- Prepare the Documents using Word processors and Prepare spread sheets for calculations .using excel and also the documents using LAtEX.
- 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.

**Note:** Use open source tools for implementation of the above exercises.

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**(20A51101P) CHEMISTRY LAB**

(CSE, AI & DS, CSE (AI), CSE(IoT), CSE (Data Science), CSE(AI & ML), IT, ECE, EEE and IT)

**Course Objectives:**

- Verify the fundamental concepts with experiments

**List of Experiments:**

1. Measurement of  $10Dq$  by spectrophotometric method
2. Models of potential energy surfaces
3. Conductometric titration of (i) strong acid vs. strong base, (ii) weak acid vs. strong base
4. Determination of cell constant and conductance of solutions
5. Potentiometry - determination of redox potentials and emfs
6. Determination of Strength of an acid in Pb-Acid battery
7. Preparation of a Bakelite and measurement of its mechanical properties (strength.).
8. Verify Lambert-Beer's law
9. Thin layer chromatography
10. Identification of simple organic compounds by IR.
11. Preparation of nanomaterial's by precipitation
12. 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)
- Prepare advanced polymer Bakelite materials (L2)
- Measure the strength of an acid present in secondary batteries (L3)
- Analyse the IR of some organic compounds (L3)

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**L T P C**  
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**(20A05201P) C-PROGRAMMING & DATA STRUCTURES LAB**

(Common to All Branches of Engineering)

**Course Objectives:**

- To get familiar with the basic concepts of C programming.
- To design programs using arrays, strings, pointers and structures.
- To illustrate the use of Stacks and Queues
- To apply different operations on linked lists.
- To demonstrate Binary search tree traversal techniques.
- To design searching and sorting techniques.

**Week 1**

Write C programs that use both recursive and non-recursive functions

- i) To find the factorial of a given integer.
- ii) To find the GCD (greatest common divisor) of two given integers.
- iii) To solve Towers of Hanoi problem.

**Week 2**

- a) Write a C program to find both the largest and smallest number in a list of integers.
- b) Write a C program that uses functions to perform the following:
  - i) Addition of Two Matrices    ii) Multiplication of Two Matrices

**Week 3**

- a) Write a C program that uses functions to perform the following operations:
  - i) To insert a sub-string in to a given main string from a given position.
  - ii) To delete n characters from a given position in a given string.

**Week 4**

- a) Write a C program that displays the position or index in the string S where the string T begins, or – 1 if S doesn't contain T.
- b) Write a C program to count the lines, words and characters in a given text.

**Week 5**

- a) Write a C Program to perform various arithmetic operations on pointer variables.
- b) Write a C Program to demonstrate the following parameter passing mechanisms:
  - i) call-by-value                      ii) call-by-reference

### **Week 6**

Write a C program that uses functions to perform the following operations:

- i) Reading a complex number
- ii) Writing a complex number
- iii) Addition of two complex numbers
- iv) Multiplication of two complex numbers

(Note: represent complex number using a structure.)

### **Week 7**

Write C programs that implement stack (its operations) using

- i) Arrays
- ii) Pointers

### **Week 8**

Write C programs that implement Queue (its operations) using

- i) Arrays
- ii) Pointers

### **Week 9**

Write a C program that uses Stack operations to perform the following:

- i) Converting infix expression into postfix expression
- ii) Evaluating the postfix expression

### **Week 10**

Write a C program that uses functions to perform the following operations on singly linked list.

- i) Creation
- ii) Insertion
- iii) Deletion
- iv) Traversal

### **Week 11**

Write a C program that uses functions to perform the following operations on Doubly linkedlist.

- i) Creation
- ii) Insertion
- iii) Deletion
- iv) Traversal

### **Week 12**

Write a C program that uses functions to perform the following operations on circular linkedlist.

- i) Creation
- ii) Insertion
- iii) Deletion
- iv) Traversal

### Week 13

Write a C program that uses functions to perform the following:

- i) Creating a Binary Tree of integers
- ii) Traversing the above binary tree in preorder, inorder and postorder.

### Week 14

Write C programs that use both recursive and non-recursive functions to perform the following searching operations for a key value in a given list of integers:

- i) Linear search
- ii) Binary search

### Week 15

Write a C program that implements the following sorting methods to sort a given list of integers in ascending order

- i) Bubble sort
- ii) Selection sort
- iii) Insertion sort

### Text Books:

1. Programming in C and Data Structures, J.R.Hanly, Ashok N. Kamthane and A. Ananda Rao, Pearson Education.
2. B.A. Forouzon and R.F. Gilberg, "COMPUTER SCIENCE: A Structured Programming Approach Using C", Third edition, CENGAGE Learning, 2016.
3. Richard F. Gilberg & Behrouz A. Forouzan, "Data Structures: A Pseudocode Approach with C", Second Edition, CENGAGE Learning, 2011.

### Reference Books:

1. PradipDey and ManasGhosh, Programming in C, Oxford University Press, 2nd Edition 2011.
2. E.Balaguruswamy, "C and Data Structures", 4<sup>th</sup> Edition, Tata Mc Graw Hill.
3. A.K.Sharma, Computer Fundamentals and Programming in C, 2nd Edition, University Press.
4. M.T.Somashekara, "Problem Solving Using C", PHI, 2<sup>nd</sup> Edition 2009.

### Course Outcomes

- Demonstrate basic concepts of C programming language. (L2)
- Develop C programs using functions, arrays, structures and pointers. (L6)
- Illustrate the concepts Stacks and Queues. (L2)
- Design operations on Linked lists. (L6)
- Apply various Binary tree traversal techniques. (L3)
- Develop searching and sorting methods. (L6)

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**(20A02101P) BASIC ELECTRICAL & ELECTRONICS ENGINEERING LAB**

(Civil, Mechanical, CSE, AI & DS, CSE (AI), CSE(IoT), CSE (Data Science), CSE(AI & ML), IT and Food Technology)

**Part A: Electrical Engineering Lab**

**Course Objectives:**

- To Verify Kirchoff's laws and Superposition theorem
- To learn performance characteristics of DC Machines.
- To perform various tests on 1- Phase Transformer.
- To Study the I – V Characteristics of Solar PV Cell

**List of experiments: -**

1. Verification of Kirchhoff laws.
2. Verification of Superposition Theorem.
3. Magnetization characteristics of a DC Shunt Generator.
4. Speed control of DC Shunt Motor.
5. OC & SC test of 1 – Phase Transformer.
6. Load test on 1-Phase Transformer.
7. I – V Characteristics of Solar PV cell
8. Brake test on DC Shunt Motor.

**Course Outcomes:**

After completing the course, the student will be able to

- Understand Kirchoff's Laws & Superposition theorem.
- Analyze the various characteristics on DC Machines by conducting various tests.
- Analyze I – V Characteristics of PV Cell
- Apply the knowledge to perform various tests on 1-phase transformer

**Part B: Electronics Engineering Lab**

**Course Objectives:**

- To verify the theoretical concepts practically from all the experiments.
- To analyze the characteristics of Diodes, BJT, MOSFET, UJT.
- To design the amplifier circuits from the given specifications.
- Exposed to linear and digital integrated circuits.

**List Of Experiments:**

1. PN Junction diode characteristics A) Forward bias B) Reverse bias.
2. Zener diode characteristics and Zener as voltage Regulator.

3. Full Wave Rectifier with & without filter.
4. Wave Shaping Circuits. (Clippers & Clampers)
5. Input & Output characteristics of Transistor in CB / CE configuration.
6. Frequency response of CE amplifier.
7. Inverting and Non-inverting amplifiers using Op-AMPs.
8. Verification of Truth Table of AND, OR, NOT, NAND, NOR, Ex-OR, Ex-NOR gates using ICs.
9. Verification of Truth Tables of S-R, J-K& D flip flops using respective ICs.

**Tools / Equipment Required:** DC Power supplies, Multi meters, DC Ammeters, DC Voltmeters, AC Voltmeters, CROs, all the required active devices.

**Course outcomes:**

- Learn the characteristics of basic electronic devices like PN junction diode, Zener diode & BJT.
- Construct the given circuit in the lab
- Analyze the application of diode as rectifiers, clippers and clampers and other circuits.
- Design simple electronic circuits and verify its functioning.

Note: Minimum Six Experiments to be performed in each section.

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR****B.Tech-CSE – II Sem**

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**(20A54202) PROBABILITY AND STATISTICS**

(Common to CSE, AI &amp; DS, CSE (AI), CSE(IoT), CSE (Data Science), CSE(AI &amp; ML) and IT)

**Course Objectives:**

- To familiarize the students with the foundations of probability and statistical methods
- To impart probability concepts and statistical methods in various applications Engineering

**Unit 1:****Descriptive statistics**

Statistics Introduction, Measures of Variability (dispersion) Skewness Kurtosis, correlation, correlation coefficient, rank correlation, principle of least squares, method of least squares, regression lines, regression coefficients and their properties.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- summarize the basic concepts of data science and its importance in engineering (L2)
- analyze the data quantitatively or categorically, measure of averages, variability (L4)
- adopt correlation methods and principle of least squares, regression analysis (L5)

**UNIT 2: Probability**

Probability, probability axioms, addition law and multiplicative law of probability, conditional probability, Baye's theorem, random variables (discrete and continuous), probability density functions, properties.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Define the terms trial, events, sample space, probability, and laws of probability (L1)
- Make use of probabilities of events in finite sample spaces from experiments (L3)
- Apply Baye's theorem to real time problems (L3)
- Explain the notion of random variable, distribution functions and expected value(L2)

**UNIT 3:****Probability distributions**

Discrete distribution - Binomial, Poisson approximation to the binomial distribution and their properties. Continuous distribution: normal distribution and their properties.

**Learning Outcomes:**

At the end of this unit, the student will be able to



- Apply Binomial and Poisson distributions for real data to compute probabilities, theoretical frequencies (L3)
- Interpret the properties of normal distribution and its applications (L2)

#### Unit4:

##### **Estimation and Testing of hypothesis, large sample tests**

Estimation-parameters, statistics, sampling distribution, point estimation, Formulation of null hypothesis, alternative hypothesis, the critical and acceptance regions, level of significance, two types of errors and power of the test. Large Sample Tests: Test for single proportion, difference of proportions, test for single mean and difference of means. Confidence interval for parameters in one sample and two sample problems

##### **Learning Outcomes:**

At the end of this unit, the student will be able to

- Explain the concept of estimation, interval estimation and confidence intervals (L2)
- Apply the concept of hypothesis testing for large samples (L4)

#### Unit 5:

##### **Small sample tests**

Student t-distribution (test for single mean, two means and paired t-test), testing of equality of variances (F-test),  $\chi^2$  - test for goodness of fit,  $\chi^2$  - test for independence of attributes.

##### **Learning Outcomes:**

At the end of this unit, the student will be able to

- Apply the concept of testing hypothesis for small samples to draw the inferences (L3)
- Estimate the goodness of fit (L5)

##### **Text Books:**

1. Miller and Friends, Probability and Statistics for Engineers, 7/e, Pearson, 2008.
2. S.C. Gupta and V.K. Kapoor, Fundamentals of Mathematical Statistics, 11/e, Sultan Chand & Sons Publications, 2012.

##### **Reference Books:**

1. S. Ross, a First Course in Probability, Pearson Education India, 2002.
2. W. Feller, an Introduction to Probability Theory and its Applications, 1/e, Wiley, 1968.
3. Peyton Z. Peebles, Probability, Random Variables & Random Signal Principles -, McGraw Hill Education, 4th Edition, 2001.

##### **Course Outcomes:**

Upon successful completion of this course, the student should be able to

- Make use of the concepts of probability and their applications (L3)
- Apply discrete and continuous probability distributions (L3)
- Classify the concepts of data science and its importance (L4)
- Interpret the association of characteristics and through correlation and regression tools (L4)

- Design the components of a classical hypothesis test (L6)
- Infer the statistical inferential methods based on small and large sampling tests (L6)

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**20A56201T APPLIED PHYSICS**

(ECE, EEE, CSE, AI & DS, CSE (AI), CSE(IoT), CSE (Data Science), CSE(AI & ML), IT)

### Course Objectives

- To make a bridge between the physics in school and engineering courses.
- To identify the importance of the optical phenomenon i.e. interference, diffraction and polarization related to its Engineering applications
- 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.
- To explain the significant concepts of dielectric and magnetic materials that leads to potential applications in the emerging micro devices.
- 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.
- 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

**Interference**- Principle of superposition – Interference of light – Conditions for sustained interference - Interference in thin films (Reflection Geometry) – Colors in thin films – Newton’s Rings – Determination of wavelength and refractive index.

**Diffraction**- Introduction – Fresnel and Fraunhofer diffraction – Fraunhofer diffraction due to single slit, double slit and N-slits (qualitative) – Grating spectrum.

**Polarization**- Introduction – Types of polarization – Polarization by reflection, refraction and double refraction - Nicol’s Prism - Half wave and Quarter wave plates with applications.

#### Learning Outcomes:

At the end of this unit, the student 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**

**Lasers-** Introduction – Characteristics of laser – Spontaneous and Stimulated emission of radiation – Einstein's coefficients – Population inversion – Lasing action – Pumping mechanisms – Nd-YAG laser – He-Ne 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 – Propagation Losses (qualitative) – Applications.

### **Learning Outcomes:**

At the end of this unit, the student 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**

**Dielectric Materials-** Introduction – Dielectric polarization – Dielectric polarizability, Susceptibility and Dielectric constant – Types of polarizations: Electronic, Ionic and Orientation polarizations (Qualitative) – Lorentz internal field – Clausius-Mossotti equation.

**Magnetic Materials-** Introduction – Magnetic dipole moment – Magnetization – Magnetic susceptibility and Permeability – Origin of permanent magnetic moment – Classification of magnetic materials: Dia, para & Ferro-Domain concept of Ferromagnetism (Qualitative) – Hysteresis – Soft and Hard magnetic materials.

### **Learning Outcomes:**

At the end of this unit, the student 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 Clausius-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)

## Unit IV:

### **Quantum Mechanics, Free Electron Theory and Band theory of Solids**

**Quantum Mechanics-** Dual nature of matter – Schrodinger's time independent and dependent wave equation – Significance of wave function – Particle in a one-dimensional infinite potential well.

**Free Electron Theory-** Classical free electron theory (Merits and demerits only) – Quantum free electron theory – Equation for electrical conductivity based on quantum free electron theory – Fermi-Dirac distribution – Density of states – 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.

### Learning Outcomes:

At the end of this unit, the student 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

**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 – Hall coefficient – Applications of Hall effect.

**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.

### Learning Outcomes:

At the end of this unit, the student 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 – Dr. M.N. Avadhanulu & Dr. P.G. Kshirsagar, S. Chand and Company
2. Engineering Physics – B.K. Pandey and S. Chaturvedi, Cengage Learning.

### Reference Books:

1. Engineering Physics – Shatendra Sharma, Jyotsna Sharma, Pearson Education, 2018
2. Engineering Physics – K. Thyagarajan, McGraw Hill Publishers
3. Engineering Physics - Sanjay D. Jain, D. Sahasrambudhe and Girish, University Press
4. Semiconductor physics and devices- Basic principle – Donald A, Neamen, Mc Graw Hill

### Course Outcomes

- Study the different realms of physics and their applications in both scientific and technological systems through physical optics. (L2)
- 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).
- Understands the response of dielectric and magnetic materials to the applied electric and magnetic fields. (L3)
- 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)
- Elaborate the physical properties exhibited by materials through the understanding of properties of semiconductors and superconductors. (L5)

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**(20A52101T) COMMUNICATIVE ENGLISH**  
 (Common to All Branches of Engineering)

### Course Objectives

- Facilitate effective listening skills for better comprehension of academic lectures and English spoken by native speakers
- Focus on appropriate reading strategies for comprehension of various academic texts and authentic materials
- Help improve speaking skills through participation in activities such as role plays, discussions and structured talks/oral presentations
- Impart effective strategies for good writing and demonstrate the same in summarizing, writing well organized essays, record and report useful information
- Provide knowledge of grammatical structures and vocabulary and encourage their appropriate use in speech and writing

### 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:** Parts of Speech, 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, Paragraph Writing **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

## UNIT-4

### Lesson: Innovation: Muhammad Yunus

**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:** Letter Writing: Official Letters/Report Writing **Grammar and Vocabulary:** Quantifying expressions - adjectives and adverbs; comparing and contrasting; Voice - Active & Passive Voice



## 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

## Text Book:

1. Language and Life: A Skills Approach- I Edition 2019, Orient Black Swan

## 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. Raymond Murphy's English Grammar in Use Fourth Edition (2012) E-book
4. Hewings, Martin. Cambridge Academic English (B2). CUP, 2012.
5. Oxford Learners Dictionary, 12<sup>th</sup> Edition, 2011
6. Norman Lewis Word Power Made Easy- The Complete Handbook for Building a Superior Vocabulary (2014)
7. Speed Reading with the Right Brain: Learn to Read Ideas Instead of Just Words by David Butler

## Course Outcomes

- Retrieve the knowledge of basic grammatical concepts
- Understand the context, topic, and pieces of specific information from social or transactional dialogues spoken by native speakers of English
- Apply grammatical structures to formulate sentences and correct word forms
- Analyze discourse markers to speak clearly on a specific topic in informal discussions
- Evaluate reading/listening texts and to write summaries based on global comprehension of these texts.
- Create a coherent paragraph interpreting a figure/graph/chart/table

## Web links

[www.englishclub.com](http://www.englishclub.com)  
[www.easyworldofenglish.com](http://www.easyworldofenglish.com)  
[www.languageguide.org/english/](http://www.languageguide.org/english/)  
[www.bbc.co.uk/learningenglish](http://www.bbc.co.uk/learningenglish)  
[www.eslpod.com/index.html](http://www.eslpod.com/index.html)  
[www.myenglishpages.com](http://www.myenglishpages.com)

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**(20A05101T) PYTHON PROGRAMMING & DATA SCIENCE**  
(CSE, AI & DS, CSE (AI), CSE(IoT), CSE (Data Science), CSE(AI & ML), IT)

**Course Objectives**

- To learn the fundamentals of Python.
- To discuss the concepts of Functions and Exceptions.
- To familiarize with Python libraries for Data Analysis and Data Visualization.
- To introduce preliminary concepts in Pattern Recognition and Machine learning.
- To provide an overview of Deep Learning and Data Science models.

**Unit-I**

Introduction to Python: Features of Python, Data types, Operators, Input and output, Control Statements.

Strings: Creating strings and basic operations on strings, string testing methods. Lists, Dictionaries, Tuples.

**Learning outcomes:**

At the end of this unit, the students will be able to

- List the basic constructs of Python. (L1)
- Apply the conditional execution of the program (L3)
- Design programs for manipulating strings (L6)
- Use the data structure lists, Dictionaries and Tuples (L3)

**Unit-II**

Functions: Defining a function, Calling a function, returning multiple values from a function, functions are first class objects, formal and actual arguments, positional arguments, recursive functions.

Exceptions: Errors in a Python program, exceptions, exception handling, types of exceptions, the except block, the assert statement, user-defined exceptions.

**Learning outcomes:**

At the end of this unit, the students will be able to

- Solve the problems by applying the modularity principle. (L3)
- Classify exceptions and explain the ways of handling them. (L4)

**Unit-III**

Introduction to NumPy, Pandas, Matplotlib.

Exploratory Data Analysis (EDA), Data Science life cycle, Descriptive Statistics, Basic tools (plots, graphs and summary statistics) of EDA, Philosophy of EDA. Data Visualization: Scatter plot, bar chart, histogram, boxplot, heat maps, etc.

**Learning outcomes:**

At the end of this unit, the students will be able to

- Demonstrate various mathematical operations on arrays using NumPy (L2)
- Analyze and manipulate Data using Pandas (L4)
- Creating static, animated, and interactive visualizations using Matplotlib. (L6)

**Unit-IV**

Introduction to Pattern Recognition and Machine Learning: Patterns, features, pattern representation, the curse of dimensionality, dimensionality reduction. Classification—linear and non-linear. Bayesian, Perceptron, Nearest neighbor classifier, Logistic regression, Naïve-Bayes, decision trees and random forests; boosting and bagging. Clustering---partitional and hierarchical; k-means clustering. Regression.

Cost functions, training and testing a classifier. Cross-validation, Class-imbalance – ways of handling, Confusion matrix, evaluation metrics.

**Learning outcomes:**

At the end of this unit, the students will be able to

- Define Patterns and their representation (L1)
- Describe the Classification and Clustering (L2)
- illustrate cost functions and class imbalance (L3)

**Unit-V**

Introduction to Deep Learning: Multilayer perceptron. Backpropagation. Loss functions. Hyperparameter tuning, Overview of RNN, CNN and LSTM.

Overview of Data Science Models: Applications to text, images, videos, recommender systems, image classification, Social network graphs.

At the end of this unit, the students will be able to

- Describe RNN, CNN and (L2)
- Explain the applications of Data Science (L2)

**Textbooks:**

1. Allen B. Downey, “Think Python”, 2nd edition, SPD/O’Reilly, 2016.
2. Cathy O’Neil, Rachel Schutt, Doing Data Science, Straight Talk from the Frontline. O’Reilly, 2013.

3. Christopher Bishop, Pattern Recognition and Machine Learning, Springer, 2007.

**References:**

1. Michael Nielsen, Neural Networks and Deep Learning, Determination Press, 2015.
2. Francois Chollet, Deep Learning with Python, 1/e, Manning Publications Company, 2017
3. EMC2: Data Science and Big Data Analytics, EMC Education Services, EMC 2 , Wiley Publication, 2015.
4. V. Susheela Devi and M. Narasimha Murty. Pattern Recognition – An Introduction. Universities Press (Indian Edition; there is an expensive Springer version of the same)
5. Goodfellow and YoshuaBengio and Aaron Courville. Deep Learning. MIT Press. Book available online at <https://www.deeplearningbook.org/>.
6. J. Leskovec, A. Rajaraman, J.D. Ullman. Mining of Massive Datasets. Cambridge University Press. (Indian Edition; Online pdf is available for download)

**Course Outcomes:**

1. Apply the features of Python language in various real applications. (L3)
2. Identify the appropriate data structure of Python for solving a problem (L2)
3. Demonstrate data analysis, manipulation and visualization of data using Python libraries (L5)
4. Enumerate machine learning algorithms. (L1)
5. Analyze the various applications of Data Science. (L4)
6. Design solutions for real-world problems using Python. (L6)

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**(20A03101T) ENGINEERING DRAWING**  
(Common to All Branches of Engineering)

**Course Objectives:**

- Bring awareness that Engineering Drawing is the Language of Engineers.
- Familiarize how industry communicates technical information.
- Teach the practices for accuracy and clarity in presenting the technical information.
- Develop the engineering imagination essential for successful design.

**Unit: I**

Introduction to Engineering Drawing: Principles of Engineering Drawing and its significance- Conventions in drawing-lettering - BIS conventions.

- a) Conic sections including the rectangular hyperbola- general method only,
- b) Cycloid, epicycloids and hypocycloid c) Involute

**Learning Outcomes:**

At the end of this unit the student will be able to

- Understand the significance of engineering drawing
- Know the conventions used in the engineering drawing
- Identify the curves obtained in different conic sections
- Draw different curves such as cycloid, involute and hyperbola

**Unit: II**

Projection of points, lines and planes: Projection of points in any quadrant, lines inclined to one or 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 meaning of projection
- Know how to draw the projections of points, lines
- Differentiate between projected length and true length
- Find the true length of the lines

**Unit: III**

**Projections of solids:** Projections of regular solids inclined to one or both planes by rotational or auxiliary views method.

### Learning Outcomes:

At the end of this unit the student will be able to

- Understand the procedure to draw projection of solids
- Differentiate between rotational method and auxiliary view method.
- Draw the projection of solid inclined to one plain
- Draw the projection of solids inclined to both the plains

### Unit: IV

**Sections of solids:** 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

- Understand different sectional views of regular solids
- Obtain the true shapes of the sections of prism
- Draw the sectional views of prism, cylinder, pyramid and cone

### Unit: V

**Development of surfaces:** 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 the meaning of development of surfaces
- Draw the development of regular solids such as prism, cylinder, pyramid and cone
- Obtain the development of sectional parts of regular shapes

### 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. Venugopal, Engineering Drawing and Graphics, 3/e, New Age Publishers, 2000
3. Shah and Rana, Engineering Drawing, 2/e, Pearson Education, 2009
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:

After completing the course, the student will be able to

- Draw various curves applied in engineering. (I2)
- Show projections of solids and sections graphically. (I2)
- Draw the development of surfaces of solids. (I3)

### Additional Sources

Youtube: <http-sewor,Carleton.cag,kardos/88403/drawings.html> conic sections-online, red woods.edu

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR****B.Tech-CSE – II Sem**

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**(20A03101P) ENGINEERING GRAPHICS LAB**

(Common to All Branches of Engineering)

**Course Objectives:**

- Instruct the utility of drafting & modeling packages in orthographic and isometric drawings.
- Train the usage of 2D and 3D modeling.
- Instruct graphical representation of machine components.

**Computer Aided Drafting:**

**Introduction to AutoCAD:** Basic drawing and editing commands: line, circle, rectangle, erase, view, undo, redo, snap, object editing, moving, copying, rotating, scaling, mirroring, layers, templates, polylines, trimming, extending, stretching, fillets, arrays, dimensions.

Dimensioning principles and conventional representations.

**Orthographic Projections:** Systems of projections, conventions and application to orthographic projections - simple objects.

**Isometric Projections:** Principles of isometric projection- Isometric scale; Isometric views: lines, planes, simple solids.

**Text Books:**

1. K. Venugopal, V.Prabhu Raja, Engineering Drawing + Auto Cad, New Age International Publishers.
2. Kulkarni D.M, AP Rastogi and AK Sarkar, Engineering Graphics with Auto Cad, PHI Learning, Eastern Economy editions.

**Reference Books:**

1. T. Jayapoovan, Engineering Graphics using Auto Cad, Vikas Publishing House
2. K.L.Narayana & P.Kannaiah, Engineering Drawing, 3/e, Scitech Publishers, Chennai, 2012.
3. Linkan Sagar, BPB Publications, Auto Cad 2018 Training Guide.
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:**

After completing the course, the student will be able to

- Use computers as a drafting tool. (L2)
- Draw isometric and orthographic drawings using CAD packages. (L3)

**Additional Sources**

1. Youtube: [http://sewor,Carleton.ca/g\\_kardos/88403/drawings.html](http://sewor.Carleton.ca/g_kardos/88403/drawings.html) conic sections-online, red woods.edu



**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR**  
**B.Tech-CSE – II Sem**

**L T P C**  
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**(20A52101P) COMMUNICATIVE ENGLISH LAB**  
(Common to All Branches of Engineering)

**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

**List of Topics**

1. Phonetics
2. Reading comprehension
3. Describing objects/places/persons
4. Role Play or Conversational Practice
5. JAM
6. Etiquettes of Telephonic Communication
7. Information Transfer
8. Note Making and Note Taking
9. E-mail Writing
10. Group Discussions-1
11. Resume Writing
12. Debates
13. Oral Presentations
14. Poster Presentation
15. Interviews Skills-1

**Suggested Software**

Orel, Walden Infotech, Young India Films

**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.
5. A Textbook of English Phonetics for Indian Students by T.Balasubramanyam

**Web Links**

[www.esl-lab.com](http://www.esl-lab.com)  
[www.englishmedialab.com](http://www.englishmedialab.com)  
[www.englishinteractive.net](http://www.englishinteractive.net)

## Course Outcomes

After completing the course, the student will be able to

- Listening and repeating the sounds of English Language
- Understand the different aspects of the English language
- proficiency with emphasis on LSRW skills
- Apply communication skills through various language learning activities
- Analyze the English speech sounds, stress, rhythm, intonation and syllable
- Division for better listening and speaking comprehension.
- Evaluate and exhibit acceptable etiquette essential in social and professional settings
- Create awareness on mother tongue influence and neutralize it in order to
- Improve fluency in spoken English.

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR****B.Tech-CSE – II Sem****L T P C**  
**0 0 3 1.5****(20A56201P) APPLIED PHYSICS LAB**

(ECE, EEE, CSE, AI &amp; DS, CSE (AI), CSE(IoT), CSE (Data Science), CSE(AI &amp; ML), IT)

**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 12 experiments (minimum 10) must be performed in a semester**

**List of Applied Physics Experiments**

1. Determine the thickness of the wire using wedge shape method
2. Determination of the radius of curvature of the lens by Newton's ring method
3. Determination of wavelength by plane diffraction grating method
4. Determination of dispersive power of prism.
5. Determination of wavelength of LASER light using diffraction grating.
6. Determination of particle size using LASER.
7. To determine the numerical aperture of a given optical fiber and hence to find its acceptance angle
8. Determination of dielectric constant by charging and discharging method.
9. Magnetic field along the axis of a circular coil carrying current –Stewart Gee's method.
10. Measurement of magnetic susceptibility by Gouy's method
11. Study the variation of B versus H by magnetizing the magnetic material (B-H curve)
12. To determine the resistivity of semiconductor by Four probe method
13. To determine the energy gap of a semiconductor
14. Determination of Hall voltage and Hall coefficient of a given semiconductor using Hall Effect.
15. Measurement of resistance with varying temperature.

**Course Outcomes:**

At the end of the 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)

## 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

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**B.Tech-CSE – II Sem**

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**(20A05101P) PYTHON PROGRAMMING & DATA SCIENCE LAB**  
(CSE, AI & DS, CSE (AI), CSE(IoT), CSE (Data Science), CSE(AI & ML), IT)

**Course Objectives:**

- To train the students in solving computational problems
- To elucidate solving mathematical problems using Python programming language
- To understand the fundamentals of Python programming concepts and its applications.
- Practical understanding of building different types of models and their evaluation

**List of Topics**

1. Write a program to demonstrate a) Different numeric data types and b) To perform different Arithmetic Operations on numbers in Python.
2. Write a program to create, append, and remove lists in Python.
3. Write a program to demonstrate working with tuples in Python.
4. Write a program to demonstrate working with dictionaries in Python.
5. Write a program to demonstrate a) arrays b) array indexing such as slicing, integer array indexing and Boolean array indexing along with their basic operations in NumPy.
6. Write a program to compute summary statistics such as mean, median, mode, standard deviation and variance of the given different types of data.
7. Write a script named copyfile.py. This script should prompt the user for the names of two text files. The contents of the first file should be the input that to be written to the second file.
8. Write a program to demonstrate Regression analysis with residual plots on a given data set.
9. Write a program to demonstrate the working of the decision tree-based ID3 algorithm. Use an appropriate data set for building the decision tree and apply this knowledge to classify a new sample.
10. Write a program to implement the Naïve Bayesian classifier for a sample training data set stored as a .CSV file. Compute the accuracy of the classifier, considering few test data sets.
11. Write a program to implement k-Nearest Neighbour algorithm to classify the iris data set. Print both correct and wrong predictions using Java/Python ML library classes.
12. Write a program to implement k-Means clustering algorithm to cluster the set of data stored in .CSV file. Compare the results of various “k” values for the quality of clustering.
13. Write a program to build Artificial Neural Network and test the same using appropriate data sets.

**Textbooks:**

1. Francois Chollet, Deep Learning with Python, 1/e, Manning Publications Company, 2017
2. Peter Wentworth, Jeffrey Elkner, Allen B. Downey and Chris Meyers, “How to Think Like a Computer Scientist: Learning with Python 3”, 3<sup>rd</sup> edition, Available at <http://www.ict.ru.ac.za/Resources/cspw/thinkcspy3/thinkcspy3.pdf>
3. Paul Barry, “Head First Python a Brain Friendly Guide” 2<sup>nd</sup> Edition, O’Reilly, 2016
4. Dainel Y.Chen “Pandas for Everyone Python Data Analysis” Pearson Education, 2019

**Course Outcomes:**

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

- Illustrate the use of various data structures. (L3)
- Analyze and manipulate Data using Pandas (L4)
- Creating static, animated, and interactive visualizations using Matplotlib. (L6)
- Understand the implementation procedures for the machine learning algorithms. (L2)
- Apply appropriate data sets to the Machine Learning algorithms (L3)
- Identify and apply Machine Learning algorithms to solve real-world problems (L1)

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR****B.Tech-CSE – II-I Sem**

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**20A54304 Discrete Mathematics & Graph theory****(Common to CSE, IT, CSE( DS), CSE (IoT), CSE (AI), CSE (AI & ML) and AI & DS)****Pre-requisite Basic Mathematics**

Course Objectives:

Introduce the concepts of mathematical logic and gain knowledge in sets, relations and functions and Solve problems using counting techniques and combinatorics and to introduce generating functions and recurrence relations. Use Graph Theory for solving real world problems

Course Outcomes (CO):

After completion of the course, students will be able to

- Apply mathematical logic to solve problems.
- Understand the concepts and perform the operations related to sets, relations and functions.
- Gain the conceptual background needed and identify structures of algebraic nature.
- Apply basic counting techniques to solve combinatorial problems.
- Formulate problems and solve recurrence relations.
- Apply Graph Theory in solving computer science problems

UNIT - I	<b>Mathematical Logic</b>	8 Hrs
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Introduction, Statements and Notation, Connectives, Well-formed formulas, Tautology, Duality law, Equivalence, Implication, Normal Forms, Functionally complete set of connectives, Inference Theory of Statement Calculus, Predicate Calculus, Inference theory of Predicate Calculus.

UNIT - II	<b>Set theory</b>	9 Hrs
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Basic Concepts of Set Theory, Relations and Ordering, The Principle of Inclusion- Exclusion, Pigeon hole principle and its application, Functions composition of functions, Inverse Functions, Recursive Functions, Lattices and its properties. Algebraic structures: Algebraic systems-Examples and General Properties, Semi groups and Monoids, groups, sub groups, homomorphism, Isomorphism.

UNIT - III	<b>Elementary Combinatorics</b>	8 Hrs
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Basics of Counting, Combinations and Permutations, Enumeration of Combinations and Permutations, Enumerating Combinations and Permutations with Repetitions, Enumerating Permutations with Constrained Repetitions, Binomial Coefficients, The Binomial and Multinomial Theorems.

UNIT - IV	<b>Recurrence Relations</b>	9 Hrs
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Generating Functions of Sequences, Calculating Coefficients of Generating Functions, Recurrence relations, Solving Recurrence Relations by Substitution and Generating functions, The Method of Characteristic roots, Solutions of Inhomogeneous Recurrence Relations.

UNIT - V

**Graphs**

9 Hrs

Basic Concepts, Isomorphism and Subgraphs, Trees and their Properties, Spanning Trees, Directed Trees, Binary Trees, Planar Graphs, Euler's Formula, Multigraphs and Euler Circuits, Hamiltonian Graphs, Chromatic Numbers, The Four Color Problem

Textbooks:

1. Joe L. Mott, Abraham Kandel and Theodore P. Baker, Discrete Mathematics for Computer Scientists & Mathematicians, 2nd Edition, Pearson Education.
2. J.P. Tremblay and R. Manohar, Discrete Mathematical Structures with Applications to Computer Science, Tata McGraw Hill, 2002.

Reference Books:

1. Kenneth H. Rosen, Discrete Mathematics and its Applications with Combinatorics and Graph Theory, 7th Edition, McGraw Hill Education (India) Private Limited.
2. Graph Theory with Applications to Engineering and Computer Science by Narsingh Deo.

Online Learning Resources:

<http://www.cs.yale.edu/homes/aspnes/classes/202/notes.pdf>



**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR****B.Tech-CSE – II-I Sem**

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**20A04304T DIGITAL ELECTRONICS & MICROPROCESSORS****Pre-requisite Basic Electronics****Course Objectives:**

- To understand all the concepts of Logic Gates and Boolean Functions.
- To learn about Combinational Logic and Sequential Logic Circuits.
- To design logic circuits using Programmable Logic Devices.
- To understand basics of 8086 Microprocessor and 8051 Microcontroller.
- To understand architecture of 8086 Microprocessor and 8051 Microcontroller.
- To learn Assembly Language Programming of 8086 and 8051.

**Course Outcomes (CO):**

After Completion of this course, the student will be able to:

- Design any Logic circuit using basic concepts of Boolean Algebra.
- Design any Logic circuit using basic concepts of PLDs.
- Design and develop any application using 8086 Microprocessor.
- Design and develop any application using 8051 Microcontroller.

**UNIT - I Number Systems & Code Conversion**

Number Systems & Code conversion, Boolean Algebra & Logic Gates, Truth Tables, Universal Gates, Simplification of Boolean functions, SOP and POS methods – Simplification of Boolean functions using K-maps, Signed and Unsigned Binary Numbers.

**UNIT - II Combinational Circuits**

Combinational Logic Circuits: Adders & Subtractors, Multiplexers, Demultiplexers, Encoders, Decoders, Programmable Logic Devices.

**UNIT - III Sequential Circuits**

Sequential Logic Circuits: RS, Clocked RS, D, JK, Master Slave JK, T Flip-Flops, Shift Registers, Types of Shift Registers, Counters, Ripple Counter, Synchronous Counters, Asynchronous Counters, Up-Down Counter.

**UNIT - IV Microprocessors - I**

8085 microprocessor Review (brief details only), 8086 microprocessor, Functional Diagram, register organization 8086, Flag register of 8086 and its functions, Addressing modes of 8086, Pin diagram of 8086, Minimum mode & Maximum mode operation of 8086, Interrupts in 8086.

UNIT – V

Microprocessors - II

Instruction set of 8086, Assembler directives, Procedures and Macros, Simple programs involving arithmetic, logical, branch instructions, Ascending, Descending and Block move programs, String Manipulation Instructions. Overview of 8051 microcontroller, Architecture, I/O ports and Memory organization, addressing modes and instruction set of 8051(Brief details only), Simple Programs.

**Text Books:**

- 1.M. Morris Mano, Michael D. Ciletti, Digital Design, Pearson Education, 5<sup>th</sup> Edition, 2013
2. Anil K. Maini, Digital Electronics: Principles, Devices and Applications, John Wiley & Sons, Ltd., 2007.
3. N. Senthil Kumar, M. Saravanan, S. Jeevanathan, Microprocessor and Microcontrollers,Oxford Publishers, 2010.
4. Advanced microprocessors and peripherals-A.K Ray and K.M.Bhurchandani, TMH, 2nd edition, 2006.

**Reference Books:**

1. Thomas L. Floyd, Digital Fundamentals – A Systems Approach, Pearson, 2013.
2. Charles H. Roth, Fundamentals of Logic Design, Cengage Learning, 5th, Edition, 2004.
3. D.V.Hall, Microprocessors and Interfacing. TMGH, 2nd edition, 2006.
4. Kenneth.J.Ayala, The 8051 microcontroller, 3rd edition, Cengage Learning,2010.

**Online Learning Resources:**

NPTEL, SWAYAM

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR**  
**B.Tech-CSE – II-I Sem**

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**20A05301T Advanced Data Structures & Algorithms**

(Common to CSE, IT, CSE(DS), CSE (IoT), CSE (AI), CSE (AI & ML) and AI & DS)

**Pre-requisite                      Data Structures**

**Course Objectives:**

- Learn asymptotic notations, and analyze the performance of different algorithms.
- Understand and implement various data structures.
- Learn and implement greedy, divide and conquer, dynamic programming and backtracking algorithms using relevant data structures.
- Understand non-deterministic algorithms, polynomial and non-polynomial problems.

**Course Outcomes (CO):**

After completion of the course, students will be able to

- Analyze the complexity of algorithms and apply asymptotic notations.
- Apply non-linear data structures and their operations.
- Understand and apply greedy, divide and conquer algorithms.
- Develop dynamic programming algorithms for various real-time applications.
- Illustrate Backtracking algorithms for various applications.

**UNIT - I                      Introduction to Algorithms                      9 Hrs**

**Introduction to Algorithms:**

Algorithms, Pseudocode for expressing algorithms, Performance Analysis-Space complexity, Time complexity, Asymptotic Notation- Big oh, Omega, Theta notation and Little oh notation, Polynomial Vs Exponential Algorithms, Average, Best and Worst Case Complexities, Analysing Recursive Programs.

**UNIT - II                      Trees Part-I                      8 Hrs**

**Trees Part-I**

**Binary Search Trees:** Definition and Operations, AVL Trees: Definition and Operations, Applications.

**B Trees:** Definition and Operations.

**UNIT - III                      Trees Part-II                      8 Hrs**

**Trees Part-II**

Red-Black Trees, Splay Trees, Applications.

**Hash Tables:** Introduction, Hash Structure, Hash functions, Linear Open Addressing, Chaining and

Applications.

UNIT - IV                      **Divide and conquer, Greedy method**                      9 Hrs

**Divide and conquer:** General method, applications-Binary search, Finding Maximum and minimum, Quick sort, Merge sort, Strassen's matrix multiplication.

**Greedy method:** General method, applications-Job sequencing with deadlines, knapsack problem, Minimum cost spanning trees, Single source shortest path problem.

UNIT - V                      **Dynamic Programming & Backtracking**                      9 Hrs

**Dynamic Programming:** General method, applications- 0/1 knapsack problem, All pairs shortest path problem, Travelling salesperson problem, Reliability design.

**Backtracking:** General method, applications-n-queen problem, sum of subsets problem, graph coloring, Hamiltonian cycles.

**Introduction to NP-Hard and NP-Complete problems:** Basic Concepts.

Textbooks:

1. Data Structures and algorithms: Concepts, Techniques and Applications, G A V Pai.
2. Fundamentals of Computer Algorithms, Ellis Horowitz, Sartaj Sahni and Rajasekharam, Galgotia publications Pvt. Ltd.

Reference Books:

1. Classic Data Structures by D. Samanta, 2005, PHI
2. Design and Analysis of Computer Algorithms by Aho, Hopcraft, Ullman 1998, PEA.
3. Introduction to the Design and Analysis of Algorithms by Goodman, Hedetniemi, TMG.

Online Learning Resources:

[https://www.tutorialspoint.com/advanced\\_data\\_structures/index.asp](https://www.tutorialspoint.com/advanced_data_structures/index.asp)

<http://peterindia.net/Algorithms.html>

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR****B.Tech-CSE – II-I Sem**

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**20A05302T Object Oriented Programming Through Java****(Common to CSE, IT, CSE (AI), CSE (AI & ML) and AI& DS)****Pre-requisite                      Fundamental Programming****Course Objectives:**

- To understand object oriented concepts and problem solving techniques
- To obtain knowledge about the principles of inheritance and polymorphism
- To implement the concept of packages, interfaces, exception handling and concurrency mechanism.
- To design the GUIs using applets and swing controls.
- To understand the Java Database Connectivity Architecture

**Course Outcomes (CO):**

After completion of the course, students will be able to

- Solve real-world problems using OOP techniques.
- Apply code reusability through inheritance, packages and interfaces
- Solve problems using java collection framework and I/O classes.
- Develop applications by using parallel streams for better performance.
- Develop applets for web applications.
- Build GUIs and handle events generated by user interactions.
- Use the JDBC API to access the database

UNIT - I

**Introduction**

8Hrs

**Introduction:** Introduction to Object Oriented Programming, The History and Evolution of Java, Introduction to Classes, Objects, Methods, Constructors, this keyword, Garbage Collection, Data Types, Variables, Type Conversion and Casting, Arrays, Operators, Control Statements, Method Overloading, Constructor Overloading, Parameter Passing, Recursion, String Class and String handling methods.

UNIT - II

**Inheritance, Packages, Interfaces**

9Hrs

**Inheritance:** Basics, Using Super, Creating Multilevel hierarchy, Method overriding, Dynamic Method Dispatch, Using Abstract classes, Using final with inheritance, Object class,

**Packages:** Basics, Finding packages and CLASSPATH, Access Protection, Importing packages.

**Interfaces:** Definition, Implementing Interfaces, Extending Interfaces, Nested Interfaces, Applying Interfaces, Variables in Interfaces.

UNIT - III                      **Exception handling, Stream based I/O (java.io)**                      9Hrs

**Exception handling** - Fundamentals, Exception types, Uncaught exceptions, using try and catch, multiple catch clauses, nested try statements, throw, throws and finally, built-in exceptions, creating own exception subclasses.

**Stream based I/O (java.io)** – The Stream classes-Byte streams and Character streams, Reading console Input and Writing Console Output, File class, Reading and Writing Files, Random access file operations, The Console class, Serialization, Enumerations, Autoboxing, Generics.

UNIT - IV                      **Multithreading, The Collections Framework (java.util)**                      8Hrs

**Multithreading:** The Java thread model, Creating threads, Thread priorities, Synchronizing threads, Interthread communication.

**The Collections Framework (java.util):** Collections overview, Collection Interfaces, The Collection classes- Array List, Linked List, Hash Set, Tree Set, Priority Queue, Array Deque. Hashtable, Properties, Stack, Vector, String Tokenizer, Bit Set, Date, Calendar, Random, Formatter, Scanner.

UNIT - V                      **Applet, GUI Programming with Swings, Accessing Databases with JDBC**                      8Hrs

**Applet:** Basics, Architecture, Applet Skeleton, requesting repainting, using the status window, passing parameters to applets

**GUI Programming with Swings** – The origin and design philosophy of swing, components and containers, layout managers, event handling, using a push button, jtextfield, jlabel and image icon, the swing buttons, jtext field, jscrollpane, jlist, jcombobox, trees, jtable, An overview of jmenubar, jmenu and jmenuitem, creating a main menu, showmessagedialog, showconfirmdialog, showinputdialog, showoptiondialog, jdialog, create a modeless dialog.

**Accessing Databases with JDBC:**

Types of Drivers, JDBC Architecture, JDBC classes and Interfaces, Basic steps in developing JDBC applications, Creating a new database and table with JDBC.

Textbooks:

1. Java The complete reference, 9<sup>th</sup> edition, Herbert Schildt, McGraw Hill Education (India) Pvt. Ltd.
2. Java How to Program, 10<sup>th</sup> Edition, Paul Dietel, Harvey Dietel, Pearson Education.

Reference Books:

1. Understanding Object-Oriented Programming with Java, updated edition, T. Budd, Pearson Education.
2. Core Java Volume – 1 Fundamentals, Cay S. Horstmann, Pearson Education.
3. Java Programming for core and advanced learners, Sagayaraj, Dennis, Karthik and Gajalakshmi, University Press
4. Introduction to Java programming, Y. Daniel Liang, Pearson Education.
5. Object Oriented Programming through Java, P. Radha Krishna, University Press.
6. Programming in Java, S. Malhotra, S. Chaudhary, 2<sup>nd</sup> edition, Oxford Univ. Press.
7. Java Programming and Object-oriented Application Development, R.A. Johnson,

Cengage Learning.

Online Learning Resources:

[https://www.w3schools.com/java/java\\_oop.asp](https://www.w3schools.com/java/java_oop.asp)

<http://peterindia.net/JavaFiles.html>

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR****B.Tech-CSE – II-I Sem**

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**20A05303 Computer Organization****(Common to CSE, IT, CSE( DS), CSE (IoT), CSE (AI), CSE (AI & ML) and AI & DS)****Pre-requisite                      Digital Electronics****Course Objectives:**

- To learn the fundamentals of computer organization and its relevance to classical and modern problems of computer design
- To understand the structure and behavior of various functional modules of a computer.
- To learn the techniques that computers use to communicate with I/O devices
- To acquire the concept of pipelining and exploitation of processing speed.
- To learn the basic characteristics of multiprocessors

**Course Outcomes (CO):**

After completion of the course, students will be able to

- Understand computer architecture concepts related to the design of modern processors, memories and I/Os
- Identify the hardware requirements for cache memory and virtual memory
- Design algorithms to exploit pipelining and multiprocessors
- Understand the importance and trade-offs of different types of memories.
- Identify pipeline hazards and possible solutions to those hazards

**UNIT - I                      Basic Structure of Computer, Machine Instructions and Programs                      8Hrs****Basic Structure of Computer:** Computer Types, Functional Units, Basic operational Concepts, Bus Structure, Software, Performance, Multiprocessors and Multicomputer.**Machine Instructions and Programs:** Numbers, Arithmetic Operations and Programs, Instructions and Instruction Sequencing, Addressing Modes, Basic Input/output Operations, Stacks and Queues, Subroutines, Additional Instructions.**UNIT - II                      Arithmetic, Basic Processing Unit                      9Hrs****Arithmetic:** Addition and Subtraction of Signed Numbers, Design of Fast Adders, Multiplication of Positive Numbers, Signed-operand Multiplication, Fast Multiplication, Integer Division, Floating-Point Numbers and Operations.**Basic Processing Unit:** Fundamental Concepts, Execution of a Complete Instruction, Multiple-Bus Organization, Hardwired Control, and Multi programmed Control.**UNIT - III                      The Memory System                      8Hrs****The Memory System:** Basic Concepts, Semiconductor RAM Memories, Read-Only Memories, Speed, Size and Cost, Cache Memories, Performance Considerations, Virtual Memories, Memory Management Requirements, Secondary Storage.



UNIT - IV                      **Input/Output Organization**    8Hrs

**Input/Output Organization:** Accessing I/O Devices, Interrupts, Processor Examples, Direct Memory Access, Buses, Interface Circuits, Standard I/O Interfaces.

UNIT - V                      **Pipelining, Large Computer Systems**    9 Hrs

**Pipelining:** Basic Concepts, Data Hazards, Instruction Hazards, Influence on Instruction Sets.

**Large Computer Systems:** Forms of Parallel Processing, Array Processors, The Structure of General-Purpose multiprocessors, Interconnection Networks.

Textbooks:

1. Carl Hamacher, ZvonkoVranesic, SafwatZaky, “Computer Organization”, 5<sup>th</sup> Edition, McGraw Hill Education, 2013.

Reference Books:

1. M.Morris Mano, “Computer System Architecture”, 3<sup>rd</sup> Edition, Pearson Education.
2. Themes and Variations, Alan Clements, “Computer Organization and Architecture”, CENGAGE Learning.
3. SmrutiRanjanSarangi, “Computer Organization and Architecture”, McGraw Hill Education.
4. John P.Hayes, “Computer Architecture and Organization”, McGraw Hill Education

Online Learning Resources:

<https://nptel.ac.in/courses/106/103/106103068/>

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR**

**B.Tech-CSE – II-I Sem**

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**20A04304P DIGITAL ELECTRONICS & MICROPROCESSORS LAB**

Basic Electronics Engineering,

Course Objectives:

- To understand all the concepts of Logic Gates and Boolean Functions.
- To learn about Combinational Logic and Sequential Logic Circuits.
- To design logic circuits using Programmable Logic Devices.
- To understand basics of 8086 Microprocessor and 8051 Microcontroller.
- To understand architecture of 8086 Microprocessor and 8051 Microcontroller.
- To learn Assembly Language Programming of 8086 and 8051.

Course Outcomes (CO):

After Completion of this course, the student will be able to:

- Design any Logic circuit using basic concepts of Boolean Algebra.
- Design any Logic circuit using basic concepts of PLDs.
- Design and develop any application using 8086 Microprocessor.
- Design and develop any application using 8051 Microcontroller.

**List of Experiments:**

Note: Minimum of 12 (6+6) experiments shall be conducted from both the sections given below:

**DIGITAL ELECTRONICS:**

1. Verification of Truth Table for AND, OR, NOT, NAND, NOR and EX-OR gates.
2. Realisation of NOT, AND, OR, EX-OR gates with only NAND and only NOR gates.
3. Karnaughmap Reduction and Logic Circuit Implementation.
4. Verification of DeMorgan's Laws.
5. Implementation of Half-Adder and Half-Subtractor.
6. Implementation of Full-Adder and Full-Subtractor.
7. Four Bit Binary Adder
8. Four Bit Binary Subtractor using 1's and 2's Complement.

**MICROPROCESSORS (8086 Assembly Language Programming)**

1. 8 Bit Addition and Subtraction.
2. 16 Bit Addition.
3. BCD Addition .
4. BCD Subtraction.
5. 8 Bit Multiplication.
6. 8 Bit Division.
7. Searching for an Element in an Array.
8. Sorting in Ascending and Descending Orders.
9. Finding Largest and Smallest Elements from an Array.
10. Block Move

**Text Books:**

- 1.M. Morris Mano, Michael D. Ciletti, Digital Design, Pearson Education, 5<sup>th</sup> Edition, 2013.
2. Anil K. Maini, Digital Electronics: Principles, Devices and Applications, John Wiley & Sons, Ltd., 2007.
3. N. Senthil Kumar, M. Saravanan, S. Jeevanathan, Microprocessor and Microcontrollers, Oxford Publishers, 2010.
4. Advanced microprocessors and peripherals-A.K ray and K.M.Bhurchandani, TMH, 2nd edition, 2006.

**Reference Books:**

1. Thomas L. Floyd, Digital Fundamentals – A Systems Approach, Pearson, 2013.
2. Charles H. Roth, Fundamentals of Logic Design, Cengage Learning, 5th, Edition, 2004.
3. D.V.Hall, Microprocessors and Interfacing. TMGH, 2nd edition, 2006.
4. Kenneth. J. Ayala, The 8051 microcontroller, 3rd edition, Cengage Learning, 2010.

**Online Learning Resources/Virtual Labs:**

<https://www.vlab.co.in/>

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR****B.Tech-CSE – II-I Sem**

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**20A05301P Advanced Data Structures and Algorithms Lab****(Common to CSE, IT, CSE( DS), CSE (IoT), CSE (AI), CSE (AI & ML) and AI & DS)****Pre-requisite            Basics of Data Structures****Course Objectives:**

- Learn data structures for various applications.
- Implement different operations of data structures by optimizing the performance.
- Develop applications using Greedy, Divide and Conquer, dynamic programming.
- Implement applications for backtracking algorithms using relevant data structures.

**Course Outcomes (CO):**

After completion of the course, students will be able to

- Understand and apply data structure operations.
- Understand and apply non-linear data structure operations.
- Apply Greedy, divide and conquer algorithms.
- Develop dynamic programming algorithms for various real-time applications.
- Illustrate and apply backtracking algorithms, further able to understand non-deterministic algorithms.

**List of Experiments:**

1. Write a program to implement the following operations on Binary Search Tree:
 

a) Insert	b) Delete	c) Search	d) Display
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2. Write a program to perform a Binary Search for a given set of integer values.
3. Write a program to implement Splay trees.
4. Write a program to implement Merge sort for the given list of integer values.
5. Write a program to implement Quicksort for the given list of integer values.
6. Write a program to find the solution for the knapsack problem using the greedy method.
7. Write a program to find minimum cost spanning tree using Prim's algorithm
8. Write a program to find minimum cost spanning tree using Kruskal's algorithm
9. Write a program to find a single source shortest path for a given graph.
10. Write a program to find the solution for job sequencing with deadlines problems.
11. Write a program to find the solution for a 0-1 knapsack problem using dynamic programming.
12. Write a program to solve Sum of subsets problem for a given set of distinct numbers using backtracking.
13. Implement N Queen's problem using Back Tracking.

**References:**

1. Y Daniel Liang, "Introduction to Programming using Python", Pearson.
2. Benjamin Baka, David Julian, "Python Data Structures and Algorithms", Packt Publishers, 2017.
3. Rance D. Necaise, "Data Structures and Algorithms using Python", Wiley Student Edition.

**Online Learning Resources/Virtual Labs:**

<http://cse01-iiith.vlabs.ac.in/>

<http://peterindia.net/Algorithms.html>

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**20A05302P Object Oriented Programming Through Java Lab**

**(Common to CSE, IT, CSE (AI), CSE (AI & ML) and AI& DS)**

**Pre-requisite                      Fundamental Programming**

**Course Objectives:**

- To introduce the concepts of Java.
- To Practice object-oriented programs and build java applications.
- To implement java programs for establishing interfaces.
- To implement sample programs for developing reusable software components.
- To establish database connectivity in java and implement GUI applications.

**Course Outcomes (CO):**

After completion of the course, students will be able to

- Recognize the Java programming environment.
- Develop efficient programs using multithreading.
- Design reliable programs using Java exception handling features.
- Extend the programming functionality supported by Java.
- Select appropriate programming constructs to solve a problem.

**List of Experiments:**

**Week-1**

a. Installation of Java software, study of any Integrated development environment, Use Eclipse or Netbeans platform and acquaint with the various menus. Create a test project, add a test class and run it.

See how you can use auto suggestions, auto fill. Try code formatter and code refactoring like renaming variables, methods and classes. Try debug step by step with java program to find prime numbers between 1 to n.

b. Write a Java program that prints all real solutions to the quadratic equation  $ax^2+bx+c=0$ . Read in a, b, c and use the quadratic formula.

c. Develop a Java application to generate Electricity bills. Create a class with the following members: Consumer no., consumer name, previous month reading, current month reading, type of EB connection (i.e domestic or commercial). Compute the bill amount using the following tariff.

If the type of the EB connection is domestic, calculate the amount to be paid as follows:

- First 100 units - Rs. 1 per unit
- 101-200 units - Rs. 2.50 per unit
- 201 -500 units - Rs. 4 per unit
- > 501 units - Rs. 6 per unit

If the type of the EB connection is commercial, calculate the amount to be paid as follows:

- First 100 units - Rs. 2 per unit
- 101-200 units - Rs. 4.50 per unit
- 201 -500 units - Rs. 6 per unit
- > 501 units - Rs. 7 per unit

d. Write a Java program to multiply two given matrices.

### Week-2

- a. Write Java program on use of inheritance, preventing inheritance using final, abstract classes.
- b. Write Java program on dynamic binding, differentiating method overloading and overriding.
- c. Develop a java application to implement currency converter (Dollar to INR, EURO to INR, Yen) using  
Interfaces.

### Week-3

- a. Write Java program that inputs 5 numbers, each between 10 and 100 inclusive. As each number is read, display it only if it's not a duplicate of any number already read display the complete set of unique values input after the user enters each new value.
- b. Write a Java Program to create an abstract class named Shape that contains two integers and an empty method named print Area(). Provide three classes named Rectangle, Triangle and Circle such that each one of the classes extends the class Shape. Each one of the classes contains only the method print Area () that prints the area of the given shape.
- c. Write a Java program to read the time intervals (HH:MM) and to compare system time if the system Time between your time intervals print correct time and exit else try again to repute the same thing. By using StringTokenizer class.

### Week-4

- a. Write a Java program to implement user defined exception handling.
- b. Write java program that inputs 5 numbers, each between 10 and 100 inclusive. As each number is read display it only if it's not a duplicate of any number already read. Display the complete set of unique values input after the user enters each new value.

### Week-5

- a. Write a Java program that creates a user interface to perform integer division. The user enters two numbers in the text fields, Num1 and Num2. The division of Num1 and Num2 is displayed in the Result field when the Divide button is clicked. If Num1 and Num2 were not integers, the program would throw a Number Format Exception. If Num2 were zero, the program would throw an Arithmetic Exception Display the exception in a message dialog box.
- b. Write a Java program that creates three threads. First thread displays —Good Morning! every one second, the second thread displays —Hello! every two seconds and the third thread displays —Welcome! every three seconds.

### Week-6

- a. Write a java program to split a given text file into n parts. Name each part as the name of the original file followed by .part where n is the sequence number of the part file.
- b. Write a Java program that reads a file name from the user, displays information about whether the file exists, whether the file is readable, or writable, the type of file and the length of the file  
in bytes.

### Week-7

- a. Write a java program that displays the number of characters, lines and words in a text file.
- b. Write a java program that reads a file and displays the file on the screen with line number before each line.

### Week-8

- a. Write a Java program that correctly implements the producer-consumer problem using the concept of inter thread communication.
- b. Develop a Java application for stack operation using Buttons and JOptionPane input and Message dialog box.
- c. Develop a Java application to perform Addition, Division, Multiplication and subtraction using the JOptionPane dialog Box and Textfields.

### Week-9

- a. Develop a Java application for the blinking eyes and mouth should open while blinking.
- b. Develop a Java application that simulates a traffic light. The program lets the user select one of the three lights: Red, Yellow or Green with radio buttons. On selecting a button an appropriate message with —STOP| or —READY| or |GO| should appear above the buttons in the selected color. Initially, there is no message shown.

### Week-10

- a. Develop a Java application to implement the opening of a door while opening man should present before hut and closing man should disappear.
- b. Develop a Java application by using JTextField to read decimal values and converting a decimal number into a binary number then print the binary value in another JTextField.

### Week-11

- a. Develop a Java application that handles all mouse events and shows the event name at the center of the window when a mouse event is fired. Use adapter classes.
- b. Develop a Java application to demonstrate the key event handlers.

### Week-12

- a. Develop a Java application to find the maximum value from the given type of elements using a generic function.
- b. Develop a Java application that works as a simple calculator. Use a grid layout to arrange buttons for the digits and for the +, -,\*, % operations. Add a text field to display the result.
- c . Develop a Java application for handling mouse events.

### Week-13

- a. Develop a Java application to establish a JDBC connection, create a table student with properties name, register number, mark1, mark2, mark3. Insert the values into the table by using java and display the information of the students at front end.

### References:

1. P. J. Deitel, H. M. Deitel, “Java for Programmers”, Pearson Education, PHI, 4th Edition, 2007.
2. P. Radha Krishna, “Object Oriented Programming through Java”, Universities Press, 2nd Edition, 2007
3. Bruce Eckel, “Thinking in Java”, Pearson Education, 4th Edition, 2006.
4. Sachin Malhotra, Saurabh Chaudhary, “Programming in Java”, Oxford University Press, 5th Edition, 2010.

### Online Learning Resources/Virtual Labs:



<https://java-iitd.vlabs.ac.in/>

<http://peterindia.net/JavaFiles.html>

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**(20A52201) UNIVERSAL HUMAN VALUES**  
**(Common to all branches)**

**Course Objective:**

The objective of the course is four fold:

- Development of a holistic perspective based on self-exploration about themselves (human being), family, society and nature/existence.
- Understanding (or developing clarity) of the harmony in the human being, family, society and nature/existence
- Strengthening of self-reflection.
- Development of commitment and courage to act.

**COURSE TOPICS:**

The course has 28 lectures and 14 practice sessions in 5 modules:

**Unit 1:**

**Course Introduction - Need, Basic Guidelines, Content and Process for Value Education**

- Purpose and motivation for the course, recapitulation from Universal Human Values-I
- Self-Exploration–what is it? - Its content and process; ‘Natural Acceptance’ and Experiential Validation- as the process for self-exploration
- Continuous Happiness and Prosperity- A look at basic Human Aspirations
- Right understanding, Relationship and Physical Facility- the basic requirements for fulfilment of aspirations of every human being with their correct priority
- Understanding Happiness and Prosperity correctly- A critical appraisal of the current scenario
- Method to fulfil the above human aspirations: understanding and living in harmony at various levels.

Include practice sessions to discuss natural acceptance in human being as the innate acceptance for living with responsibility (living in relationship, harmony and co-existence) rather than as arbitrariness in choice based on liking-disliking

**Unit 2:**

**Understanding Harmony in the Human Being - Harmony in Myself!**

- Understanding human being as a co-existence of the sentient ‘I’ and the material ‘Body’
- Understanding the needs of Self (‘I’) and ‘Body’ - happiness and physical facility

- Understanding the Body as an instrument of 'I' (I being the doer, seer and enjoyer)
- Understanding the characteristics and activities of 'I' and harmony in 'I'
- Understanding the harmony of I with the Body: Sanyam and Health; correct appraisal of Physical needs, meaning of Prosperity in detail
- Programs to ensure Sanyam and Health.

Include practice sessions to discuss the role others have played in making material goods available to me. Identifying from one's own life. Differentiate between prosperity and accumulation. Discuss program for ensuring health vs dealing with disease

### **Unit 3:**

#### **Understanding Harmony in the Family and Society- Harmony in Human- Human Relationship**

- Understanding values in human-human relationship; meaning of Justice (nine universal values in relationships) and program for its fulfilment to ensure mutual happiness; Trust and Respect as the foundational values of relationship
- Understanding the meaning of Trust; Difference between intention and competence
- Understanding the meaning of Respect, Difference between respect and differentiation; the other salient values in relationship
- Understanding the harmony in the society (society being an extension of family): Resolution, Prosperity, fearlessness (trust) and co-existence as comprehensive Human Goals
- Visualizing a universal harmonious order in society- Undivided Society, Universal Order- from family to world family.

Include practice sessions to reflect on relationships in family, hostel and institute as extended family, real life examples, teacher-student relationship, goal of education etc. Gratitude as a universal value in relationships. Discuss with scenarios. Elicit examples from students' lives

### **Unit 4:**

#### **Understanding Harmony in the Nature and Existence - Whole existence as Coexistence**

- Understanding the harmony in the Nature
- Interconnectedness and mutual fulfilment among the four orders of nature- recyclability and self-regulation in nature
- Understanding Existence as Co-existence of mutually interacting units in all- pervasive space
- Holistic perception of harmony at all levels of existence.

Include practice sessions to discuss human being as cause of imbalance in nature (film "Home" can be used), pollution, depletion of resources and role of technology etc.

## Unit 5:

### Implications of the above Holistic Understanding of Harmony on Professional Ethics

- Natural acceptance of human values
- Definitiveness of Ethical Human Conduct
- Basis for Humanistic Education, Humanistic Constitution and Humanistic Universal Order
- Competence in professional ethics: a. Ability to utilize the professional competence for augmenting universal human order b. Ability to identify the scope and characteristics of people friendly and eco-friendly production systems, c. Ability to identify and develop appropriate technologies and management patterns for above production systems.
- Case studies of typical holistic technologies, management models and production systems
- Strategy for transition from the present state to Universal Human Order: a. At the level of individual: as socially and ecologically responsible engineers, technologists and managers b. At the level of society: as mutually enriching institutions and organizations
- Sum up.

Include practice Exercises and Case Studies will be taken up in Practice (tutorial) Sessions eg. To discuss the conduct as an engineer or scientist etc.

### Text Book

1. R R Gaur, R Asthana, G P Bagaria, "A Foundation Course in Human Values and Professional Ethics", 2<sup>nd</sup> Revised Edition, Excel Books, New Delhi, 2019. ISBN 978-93-87034-47-1
2. R R Gaur, R Asthana, G P Bagaria, "Teachers' Manual for A Foundation Course in Human Values and Professional Ethics", 2<sup>nd</sup> Revised Edition, Excel Books, New Delhi, 2019. ISBN 978-93-87034-53-2

### Reference Books

1. Jeevan Vidya: Ek Parichaya, A Nagaraj, Jeevan Vidya Prakashan, Amar kantak, 1999.
2. A. N. Tripathi, "Human Values", New Age Intl. Publishers, New Delhi, 2004.
3. The Story of Stuff (Book).
4. Mohandas Karamchand Gandhi "The Story of My Experiments with Truth"
5. E. F. Schumacher. "Small is Beautiful"
6. Slow is Beautiful –Cecile Andrews
7. J C Kumarappa "Economy of Permanence"
8. Pandit Sunderlal "Bharat Mein Angreji Raj"
9. Dharampal, "Rediscovering India"
10. Mohandas K. Gandhi, "Hind Swaraj or Indian Home Rule"
11. India Wins Freedom - Maulana Abdul Kalam Azad
12. Vivekananda - Romain Rolland(English)
13. Gandhi - Romain Rolland (English)

### **MOE OF CONDUCT (L-T-P-C 2-1-0-2)**

Lecture hours are to be used for interactive discussion, placing the proposals about the topics at hand and motivating students to reflect, explore and verify them. Tutorial hours are to be used for practice sessions.

While analyzing and discussing the topic, the faculty mentor's role is in pointing to essential elements to help in sorting them out from the surface elements. In other words, help the students explore the important or critical elements.

In the discussions, particularly during practice sessions (tutorials), the mentor encourages the student to connect with one's own self and do self-observation, self-reflection and self-exploration.

Scenarios may be used to initiate discussion. The student is encouraged to take up "ordinary" situations rather than "extra-ordinary" situations. Such observations and their analyses are shared and discussed with other students and faculty mentor, in a group sitting.

Tutorials (experiments or practical) are important for the course. The difference is that the laboratory is everyday life, and practicals are how you behave and work in real life. Depending on the nature of topics, worksheets, home assignments and/or activities are included. The practice sessions (tutorials) would also provide support to a student in performing actions commensurate to his/her beliefs. It is intended that this would lead to development of commitment, namely behaving and working based on basic human values.

### **OUTCOME OF THE COURSE:**

By the end of the course,

- Students are expected to become more aware of themselves, and their surroundings (family, society, nature)
- They would become more responsible in life, and in handling problems with sustainable solutions, while keeping human relationships and human nature in mind.
- They would have better critical ability.
- They would also become sensitive to their commitment towards what they have understood (human values, human relationship and human society).
- It is hoped that they would be able to apply what they have learnt to their own self in different day-to-day settings in real life, at least a beginning would be made in this direction.

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**20A05304 Web Application Development**

**(Common to CSE, CSE (AI), CSE (AI & ML) and AI& DS)**

**Course Objectives:**

- Learn website development using HTML, CSS, JavaScript.
- Understand the concepts of responsive web development using the bootstrap framework
- Make use of the JQueryjavascript library to provide interactiveness to the websites.
- Discover how to use Google Charts to provide a better way to visualize data on a website
- 5. Learn Content Management Systems to speed the development process

**Course Outcomes (CO):**

After completion of the course, students will be able to

- Construct web sites with valid HTML, CSS, JavaScript
- Create responsive Web designs that work on phones, tablets, or traditional laptops and wide-screen monitors.
- Develop websites using jQuery to provide interactivity and engaging user experiences
- Embed Google chart tools in a website for better visualization of data.
- Design and develop web applications using Content Management Systems like WordPress

Activities:

Module - 1:

HTML: What is a browser?, What is HTML?, Elements and Tags, Basic HTML5 structure, Metadata, <title>, Adding favicon, Comments, headings

**Task:** Create a Basic HTML document

Module - 2:

HTML (continued): Block-Level Elements & Inline Elements, Links (Understand Absolute vs Relative paths), Lists, Images, iframe (embed youtube video)

**Task:** Create your Profile Page

Module - 3:

HTML (continued): Tables: <table>, <tr>, <th>, <td>, Attributes for each Table element

**Task:** Create a Class Timetable (to merge rows/columns, use rowspan/colspan)

Module - 4:

HTML (continued): Form Elements: <input>, <select>, <textarea>, <button>, Attributes for each Form element

**Task:** Create a Student Hostel Application Form

Module - 5:

Cascading Style Sheets (CSS): CSS Properties, Types of CSS, Selectors, box model, Pseudo-elements, z-index

**Task:** Make the Hostel Application Form designed in Module -4 beautiful using CSS (add colors, backgrounds, change font properties, borders, etc.)

Module - 6:

Bootstrap - CSS Framework: Layouts (Containers, Grid system), Forms, Other Components

**Task:** Style the Hostel Application Form designed in Module-5 still more beautiful using Bootstrap CSS (Re-size browser and check how the webpage displays in mobile resolution)

Module - 7:

HTTP & Browser Developer Tools: Understand HTTP Headers (Request & Response Headers), URL & its Anatomy, Developer Tools: Elements/Inspector, Console, Network, Sources, performance, Application Storage.

**Task:** Analyse various HTTP requests (initiators, timing diagrams, responses) and identify problems if any.

Module - 8:

Javascript: Variables, Data Types, Operators, Statements, Objects, Functions, Events & Event Listeners, DOM.

**Task:** Design a simple calculator using JavaScript to perform sum, product, difference, and quotient operations:

Module - 9:

Dynamic HTML with JavaScript: Manipulate DOM, Error Handling, Promises, async/await, Modules.

**Task:** Design & develop a Shopping Cart Application with features including Add Products, Update Quantity, Display Price (Sub-Total & Total), Remove items/products from the cart.

Module - 10:

JQuery - A Javascript Library: Interactions, Widgets, Effects, Utilities, Ajax using JQuery.

**Task:** Validate all Fields and Submit the Hostel Application Form designed in Module-6 using JQuery

Module - 11:

Google Charts: Understand the Usage of Pie chart, Bar Chart, Histogram, Area & Line Charts, Gantt Charts.

**Task:** Develop an HTML document to illustrate each chart with real-time examples.

Module - 12:

Open Source CMS (Content Management System): What is a CMS?, Install CMS, Themes, Plugins.

**Task:** Develop an E-learning website using any CMS(for example WordPress)

References:

1. Deitel and Deitel and Nieto, —Internet and World Wide Web - How to Program, Prentice Hall, 5th Edition, 2011.
2. Web Technologies, Uttam K. Roy, Oxford Higher Education., 1<sup>st</sup> edition, 10<sup>th</sup> impression, 2015.
3. Stephen Wynkoop and John Burke —Running a Perfect Website, QUE, 2<sup>nd</sup> Edition, 1999.
4. Jeffrey C and Jackson, —Web Technologies A Computer Science Perspective Pearson Education, 2011.
5. Gopalan N.P. and Akilandeswari J., —Web Technology, Prentice Hall of India, 2011.

Online Learning Resources/Virtual Labs:

- a. HTML: <https://html.spec.whatwg.org/multipage/>
- b. HTML: <https://developer.mozilla.org/en-US/docs/Glossary/HTML5>
- c. CSS: <https://www.w3.org/Style/CSS/>
- d. Bootstrap - CSS Framework: <https://getbootstrap.com/>
- e. Browser Developer Tools: [https://developer.mozilla.org/en-US/docs/Learn/Common\\_questions/What\\_are\\_browser\\_developer\\_tools](https://developer.mozilla.org/en-US/docs/Learn/Common_questions/What_are_browser_developer_tools)
- f. Javascript: <https://developer.mozilla.org/en-US/docs/Web/JavaScript>
- g. JQuery: <https://jquery.com>
- h. Google Charts: <https://developers.google.com/chart>
- i. Wordpress: <https://wordpress.com>



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**20A54404 Deterministic & Stochastic Statistical Methods****(Common to CSE, IT, CSE (AD), CSE (AI & ML) and AI & DS)****Pre-requisite****Basic Mathematics****Course Objectives:**

This course provides a study of various Mathematical Methods and Statistical Methods which is needed for Artificial Intelligence, Machine Learning, and Data Science and also for Computer Science and engineering problems.

**Course Outcomes (CO):**

After completion of the course, students will be able to

- Apply logical thinking to problem-solving in context.
- Employ methods related to these concepts in a variety of data science applications.
- Use appropriate technology to aid problem-solving and data analysis.
- The Bayesian process of inference in probabilistic reasoning system.
- Demonstrate skills in unconstrained optimization.

**UNIT - I****Data Representation****9 Hrs**

Distance measures, Projections, Notion of hyper planes, half-planes. Principal Component Analysis- Population Principal Components, sample principal coefficients, covariance, matrix of data set, Dimensionality reduction, Singular value decomposition, Gram Schmidt process.

**UNIT - II****Single Variable Distribution****9 Hrs**

Random variables (discrete and continuous), probability density functions, properties, mathematical expectation- Probability distribution - Binomial, Poisson approximation to the binomial distribution and normal distribution-their properties-Uniform distribution-exponential distribution.

**UNIT - III****Stochastic Processes And Markov Chains:****9 Hrs**

Introduction to Stochastic processes- Markov process. Transition Probability, Transition Probability Matrix, First order and Higher order Markov process, step transition probabilities, Markov chain, Steady state condition, Markov analysis.

**UNIT - IV****Multivariate Distribution Theory****10 Hrs**

Multivariate Normal distribution – Properties, Distributions of linear combinations, independence, marginal distributions, conditional distributions, Partial and Multiple correlation coefficient. Moment generating function.

**BAYESIAN INFERENCE AND ITS APPLICATIONS:** Statistical tests and Bayesian model comparison, Bit, Surprisal, Entropy, Source coding theorem, Joint entropy, Conditional entropy, Kullback-Leibler divergence.

**UNIT - V****Optimization****9 Hrs**

Unconstrained optimization, Necessary and sufficiency conditions for optima, Gradient descent methods, Constrained optimization, KKT conditions, Introduction to non-gradient techniques, Introduction to least squares optimization, Optimization view of machine learning. Data Science Methods: Linear regression as an exemplar function approximation problem, linear classification problems.

Textbooks:

1. Mathematics for Machine Learning by A. Aldo Faisal, Cheng Soon Ong, and Marc Peter Deisenroth
2. Dr.B.S Grewal, Higher Engineering Mathematics, 45th Edition, Khanna Publishers.
3. Operations Research, S.D. Sharma

Reference Books:

1. Operations Research, An Introduction, Hamdy A. Taha, Pearson publishers.
2. A Probabilistic Theory of Pattern Recognition by Luc Devroye,. Laszlo Györfi, Gabor Lugosi.

Online Learning Resources:

<https://www.math.brown.edu/swatson2/classes/data1010/pdf/data1010.pdf>

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**20A05401T DATABASE MANAGEMENT SYSTEMS****(Common to CSE, IT, CSE( DS), CSE (IoT), CSE (AI), CSE (AI & ML) and AI & DS)****Course Objectives:**

This course is designed to:

- Train in the fundamental concepts of database management systems, database modeling and design, SQL, PL/SQL and system implementation techniques.
- Enable students to model ER diagrams for any customized application
- Inducting appropriate strategies for optimization of queries.
- Provide knowledge on concurrency techniques
- Demonstrate the organization of Databases

**Course Outcomes (CO):**

After completion of the course, students will be able to

- Design a database for a real-world information system
- Define transactions that preserve the integrity of the database
- Generate tables for a database
- Organize the data to prevent redundancy
- Pose queries to retrieve the information from the database.

**UNIT - I Introduction, Introduction to Relational Model 9Hrs**

**Introduction:** Database systems applications, Purpose of Database Systems, view of Data, Database Languages, Relational Databases, Database Design, Data Storage and Querying, Transaction Management, Database Architecture, Data Mining and Information Retrieval, Specialty Databases, Database users and Administrators,

**Introduction to Relational Model:** Structure of Relational Databases, Database Schema, Keys, Schema Diagrams, Relational Query Languages, Relational Operations

**UNIT - II Introduction to SQL, Advanced SQL 9 Hrs**

**Introduction to SQL:** Overview of the SQL Query Language, SQL Data Definition, Basic Structure of SQL Queries, Additional Basic Operations, Set Operations, Null Values, Aggregate Functions, Nested Sub-queries, Modification of the Database. **Intermediate SQL:** Joint Expressions, Views, Transactions, Integrity Constraints, SQL Data types and schemas, Authorization.

**Advanced SQL:** Accessing SQL from a Programming Language, Functions and Procedures, Triggers, Recursive Queries, OLAP, Formal relational query languages.

**UNIT - III Database Design and the E-R Model, Relational Database Design 8Hrs**

**Database Design and the E-R Model:** Overview of the Design Process, The Entity-Relationship Model, Constraints, Removing Redundant Attributes in Entity Sets, Entity-Relationship Diagrams, Reduction to Relational Schemas, Entity-Relationship Design Issues.

**Relational Database Design:**

Features of Good Relational Designs, Atomic Domains and First Normal Form, Decomposition Using Functional Dependencies, Functional-Dependency Theory, Algorithms for Decomposition, Decomposition Using Multivalued Dependencies, More Normal Forms.

UNIT - IV                      **Query Processing, Query optimization**                      8 Hrs

**Query Processing:** Overview, Measures of Query cost, Selection operation, sorting, Join Operation, other operations, Evaluation of Expressions.

**Query optimization:** Overview, Transformation of Relational Expressions, Estimating statistics of Expression results, Choice of Evaluation Plans, Materialized views, Advanced Topics in Query Optimization.

UNIT - V                      **Transaction Management, Concurrency Control, Recovery System**                      10Hrs

**Transaction Management:**

Transactions: Concept, A Simple Transactional Model, Storage Structures, Transaction Atomicity and Durability, Transaction Isolation, Serializability, Isolation and Atomicity, Transaction Isolation Levels, Implementation of Isolation Levels, Transactions as SQL Statements.

**Concurrency Control:** Lock-based Protocols, Deadlock Handling, Multiple granularity, Timestamp-based Protocols, and Validation-based Protocols.

**Recovery System:** Failure Classification, Storage, Recovery and Atomicity, Recovery Algorithm, Buffer Management, Failure with Loss of Nonvolatile Storage, Early Lock Release and Logical Undo Operations.

Textbooks:

1. A.Silberschatz, H.F.Korth, S.Sudarshan, "Database System Concepts",6/e, TMH 2019

Reference Books:

1. Database Management System, 6/e RamezElmasri, Shamkant B. Navathe, PEA
2. Database Principles Fundamentals of Design Implementation and Management, Carlos Coronel, Steven Morris, Peter Robb, Cengage Learning.
- 3.Database Management Systems, 3/e, Raghurama Krishnan, Johannes Gehrke,TMH

Online Learning Resources:

[https://onlinecourses.nptel.ac.in/noc21\\_cs04/preview](https://onlinecourses.nptel.ac.in/noc21_cs04/preview)

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR**  
**B.Tech-CSE – II-II Sem**

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**20A05402T OPERATING SYSTEMS**

(Common to CSE, IT, CSE( DS), CSE (IoT), CSE (AI), CSE (AI & ML) and AI & DS)

**Pre-requisite**                      **Basics of CO and DBMS**                      **Semester**

**Course Objectives:**

The course is designed to

- Understand basic concepts and functions of operating systems
- Understand the processes, threads and scheduling algorithms.
- Provide good insight on various memory management techniques
- Expose the students with different techniques of handling deadlocks
- Explore the concept of file-system and its implementation issues
- Familiarize with the basics of the Linux operating system
- Implement various schemes for achieving system protection and security

**Course Outcomes (CO):**

After completion of the course, students will be able to

- Realize how applications interact with the operating system
- Analyze the functioning of a kernel in an Operating system.
- Summarize resource management in operating systems
- Analyze various scheduling algorithms
- Examine concurrency mechanism in Operating Systems
- Apply memory management techniques in the design of operating systems
- Understand the functionality of the file system
- Compare and contrast memory management techniques.
- Understand deadlock prevention and avoidance.
- Perform administrative tasks on Linux based systems.

**UNIT - I            Operating Systems Overview, System Structures                      8Hrs**

**Operating Systems Overview:** Introduction, Operating system functions, Operating systems operations, Computing environments, Open-Source Operating Systems

**System Structures:** Operating System Services, User and Operating-System Interface, systems calls, Types of System Calls, system programs, Operating system Design and Implementation, Operating system structure, Operating system debugging, System Boot.

**UNIT - II            Process Concept, Multithreaded Programming, Process Scheduling, Inter-process Communication                      10Hrs**

**Process Concept:** Process scheduling, Operations on processes, Inter-process communication, Communication in client server systems.

**Multithreaded Programming:** Multithreading models, Thread libraries, Threading issues, Examples.

**Process Scheduling:** Basic concepts, Scheduling criteria, Scheduling algorithms, Multiple processor scheduling, Thread scheduling, Examples.

**Inter-process Communication:** Race conditions, Critical Regions, Mutual exclusion with busy waiting, Sleep and wakeup, Semaphores, Mutexes, Monitors, Message passing, Barriers, Classical IPC Problems - Dining philosophers problem, Readers and writers problem.

UNIT - III      **Memory-Management Strategies, Virtual Memory Management**      Lecture 8Hrs

**Memory-Management Strategies:** Introduction, Swapping, Contiguous memory allocation, Paging, Segmentation, Examples.

**Virtual Memory Management:** Introduction, Demand paging, Copy on-write, Page replacement, Frame allocation, Thrashing, Memory-mapped files, Kernel memory allocation, Examples.

UNIT - IV      **Deadlocks, File Systems**      Lecture 9Hrs

**Deadlocks:** Resources, Conditions for resource deadlocks, Ostrich algorithm, Deadlock detection And recovery, Deadlock avoidance, Deadlock prevention.

**File Systems:** Files, Directories, File system implementation, management and optimization.

Secondary-Storage Structure: Overview of disk structure, and attachment, Disk scheduling, RAID structure, Stable storage implementation.

UNIT - V      **System Protection, System Security**      Lecture 8Hrs

**System Protection:** Goals of protection, Principles and domain of protection, Access matrix, Access control, Revocation of access rights.

**System Security:** Introduction, Program threats, System and network threats, Cryptography as a security, User authentication, implementing security defenses, firewalling to protect systems and networks, Computer security classification.

Case Studies: Linux, Microsoft Windows.

Textbooks:

1. Silberschatz A, Galvin P B, and Gagne G, Operating System Concepts, 9th edition, Wiley, 2016.
2. Tanenbaum A S, Modern Operating Systems, 3rd edition, Pearson Education, 2008.

(Topics: Inter-process Communication and File systems.)

Reference Books:

1. Tanenbaum A S, Woodhull A S, Operating Systems Design and Implementation, 3rd edition, PHI, 2006.
2. Dhamdhere D M, Operating Systems A Concept Based Approach, 3rd edition, Tata

McGraw-Hill, 2012.

3. Stallings W, Operating Systems -Internals and Design Principles, 6th edition, Pearson Education, 2009
4. Nutt G, Operating Systems, 3rd edition, Pearson Education, 2004

Online Learning Resources:

<https://nptel.ac.in/courses/106/106/106106144/>

<http://peterindia.net/OperatingSystems.html>

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR****B.Tech-CSE – II-II Sem**

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**20A05403T Software Engineering**  
**(Common to CSE, IT, CSE( DS), CSE (IoT))**

Course Objectives:

- To learn the basic concepts of software engineering and life cycle models
- To explore the issues in software requirements specification and enable to write SRS documents for software development problems
- To elucidate the basic concepts of software design and enable to carry out procedural and object oriented design of software development problems
- To understand the basic concepts of black box and white box software testing and enable to design test cases for unit, integration, and system testing
- To reveal the basic concepts in software project management

Course Outcomes (CO):

After completion of the course, students will be able to

- Obtain basic software life cycle activity skills.
- Design software requirements specifications for given problems.
- Implement structure, object oriented analysis and design for given problems.
- Design test cases for given problems.
- Apply quality management concepts at the application level.

UNIT - I                    **Basic concepts in software engineering and software project management**                    Lecture 8Hrs

Basic concepts: abstraction versus decomposition, evolution of software engineering techniques, Software development life cycle (SDLC) models: Iterative waterfall model, Prototype model, Evolutionary model, Spiral model, RAD model, Agile models, software project management: project planning, project estimation, COCOMO, Halstead's Software Science, project scheduling, staffing, Organization and team structure, risk management, configuration management.

UNIT - II                    **Requirements analysis and specification**                    Lecture 8Hrs

The nature of software, The Unique nature of Webapps, Software Myths, Requirements gathering and analysis, software requirements specification, Traceability, Characteristics of a Good SRS Document, IEEE 830 guidelines, representing complex requirements using decision tables and decision trees, overview of formal system development techniques, axiomatic specification, algebraic specification.

UNIT - III                    **Software Design**                    Lecture 9Hrs

Good Software Design, Cohesion and coupling, Control Hierarchy: Layering, Control Abstraction, Depth and width, Fan-out, Fan-in, Software design approaches, object oriented vs. function oriented design. Overview of SA/SD methodology, structured analysis, Data flow diagram, Extending DFD technique to real life systems, Basic Object oriented concepts, UML Diagrams, Structured design, Detailed design, Design review, Characteristics of a good user interface, User Guidance and Online Help, Mode-based vs Mode-less Interface, Types of user interfaces, Component-based GUI development, User interface design methodology: GUI design methodology.

UNIT - IV                    **Coding and Testing**                    Lecture 9Hrs

Coding standards and guidelines, code review, software documentation, Testing, Black Box Testing, White Box Testing, debugging, integration testing, Program Analysis Tools, system testing, performance testing, regression testing, Testing Object Oriented Programs.

UNIT - V                    **Software quality, reliability, and other issues**                    Lecture 9Hrs



Software reliability, Statistical testing, Software quality and management, ISO 9000, SEI capability maturity model (CMM), Personal software process (PSP), Six sigma, Software quality metrics, CASE and its scope, CASE environment, CASE support in software life cycle, Characteristics of software maintenance, Software reverse engineering, Software maintenance processes model, Estimation maintenance cost. Basic issues in any reuse program, Reuse approach, Reuse at organization level.

Textbooks:

1. Rajib Mall, "Fundamentals of Software Engineering", 5th Edition, PHI, 2018.
2. Pressman R, "Software Engineering- Practioner Approach", McGraw Hill.

Reference Books:

1. Somerville, "Software Engineering", Pearson 2.
2. Richard Fairley, "Software Engineering Concepts", Tata McGraw Hill.
3. JalotePankaj, "An integrated approach to Software Engineering", Narosa

Online Learning Resources:

<https://nptel.ac.in/courses/106/105/106105182/>

<http://peterindia.net/SoftwareDevelopment.html>

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR****B.Tech-CSE – II-II Sem**

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**20A52301 MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS****(Common to All branches of Engineering)****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
- To Know the Various types of market structure and pricing methods and strategy
- To give an overview on investment appraisal methods to promote the students to learn how to plan long-term investment decisions.
- To provide fundamental skills on accounting and to explain the process of preparing financial statements

**Course Outcomes (CO):**

- Define the concepts related to Managerial Economics, financial accounting and management.
- Understand the fundamentals of Economics viz., Demand, Production, cost, revenue and markets
- Apply the Concept of Production cost and revenues for effective Business decision
- Analyze how to invest their capital and maximize returns
- Evaluate the capital budgeting techniques
- Develop the accounting statements and evaluate the financial performance of business entity.

**UNIT - I            Managerial Economics**

Introduction – Nature, meaning, significance, functions, and advantages. Demand-Concept, Function, Law of Demand - Demand Elasticity- Types – Measurement. Demand Forecasting- Factors governing Forecasting, Methods. Managerial Economics and Financial Accounting and Management.

**UNIT - II            Production and Cost Analysis**

Introduction – Nature, meaning, significance, functions and advantages. Production Function– Least-cost combination– Short run and Long run Production Function- Isoquants and Isocosts, MRTS - Cobb-Douglas Production Function - Laws of Returns - Internal and External Economies of scale. Cost & Break-Even Analysis - Cost concepts and Cost behavior- Break-Even Analysis (BEA) - Determination of Break-Even Point (Simple Problems)-Managerial significance and limitations of Break-Even Analysis.

**UNIT - III            Business Organizations and Markets**

Introduction – Nature, meaning, significance, functions and advantages. Forms of Business Organizations- Sole Proprietary - Partnership - Joint Stock Companies - Public Sector Enterprises. Types of Markets - Perfect and Imperfect Competition - Features of Perfect Competition Monopoly- Monopolistic Competition–Oligopoly-Price-Output Determination - Pricing Methods and Strategies

UNIT - IV            **Capital Budgeting**

Introduction – Nature, meaning, significance, functions and advantages. Types of Working Capital, Components, Sources of Short-term and Long-term Capital, Estimating Working capital requirements. Capital Budgeting– Features, Proposals, Methods and Evaluation. Projects – Pay Back Method, Accounting Rate of Return (ARR) Net Present Value (NPV) Internal Rate Return (IRR) Method (sample problems)

UNIT - V            **Financial Accounting and Analysis**

Introduction – Nature, meaning, significance, functions and advantages. Concepts and Conventions- Double-Entry Book Keeping, Journal, Ledger, Trial Balance- Final Accounts (Trading Account, Profit and Loss Account and Balance Sheet with simple adjustments). *Financial Analysis* - Analysis and Interpretation of Liquidity Ratios, Activity Ratios, and Capital structure Ratios and Profitability.

**Textbooks:**

1. Varshney&Maheswari: Managerial Economics, Sultan Chand, 2013.
2. Aryasri: Business Economics and Financial Analysis, 4/e, MGH, 2019

**Reference Books:**

1. Ahuja HI Managerial economics Schand,3/e,2013
2. S.A. Siddiqui and A.S. Siddiqui: Managerial Economics and Financial Analysis, New Age International, 2013.
3. Joseph G. Nellis and David Parker: Principles of Business Economics, Pearson, 2/e, New Delhi.
4. Domnick Salvatore: Managerial Economics in a Global Economy, Cengage, 2013.

**Online Learning Resources:**

<https://www.slideshare.net/123ps/managerial-economics-ppt>

<https://www.slideshare.net/rossanz/production-and-cost-45827016>

<https://www.slideshare.net/darkyla/business-organizations-19917607>

<https://www.slideshare.net/balarajbl/market-and-classification-of-market>

<https://www.slideshare.net/ruchi101/capital-budgeting-ppt-59565396>

<https://www.slideshare.net/ashu1983/financial-accounting>

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR**

**B.Tech-CSE – II-II Sem**

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**20A52302 ORGANISATIONAL BEHAVIOUR**

**(Common to All branches of Engineering)**

**Course Objectives:**

- To enable student's comprehension of organizational behavior
- To offer knowledge to students on self-motivation, leadership and management
- To facilitate them to become powerful leaders
- To Impart knowledge about group dynamics
- To make them understand the importance of change and development

**Course Outcomes (CO):**

- Define the Organizational Behaviour, its nature and scope.
- Understand the nature and concept of Organizational behaviour
- Apply theories of motivation to analyse the performance problems
- Analyse the different theories of leadership
- Evaluate group dynamics
- Develop as powerful leader

**UNIT - I Introduction to Organizational Behavior**

Meaning, definition, nature, scope and functions - Organizing Process – Making organizing effective -Understanding Individual Behaviour –Attitude -Perception - Learning – Personality.

**UNIT - II Motivation and Leading**

Theories of Motivation- Maslow's Hierarchy of Needs - Herzberg's Two Factor Theory - Vroom's theory of expectancy – Mc Clelland's theory of needs–Mc Gregor's theory X and theory Y– Adam's equity theory – Locke's goal setting theory– Alderfer's ERG theory .

**UNIT - III Organizational Culture**

Introduction – Meaning, scope, definition, Nature - Organizational Climate - Leadership - Traits Theory–Managerial Grid - Transactional Vs Transformational Leadership - Qualities of good Leader - Conflict Management -Evaluating Leader- Women and Corporate leadership.

**UNIT - IV Group Dynamics**

Introduction – Meaning, scope, definition, Nature- Types of groups - Determinants of group behavior - Group process – Group Development - Group norms - Group cohesiveness - Small Groups - Group decision making - Team building - Conflict in the organization– Conflict resolution

**UNIT - V Organizational Change and Development**

Introduction –Nature, Meaning, scope, definition and functions- Organizational Culture - Changing the Culture – Change Management – Work Stress Management - Organizational management – Managerial implications of organization’s change and development

**Textbooks:**

1. Luthans, Fred, Organisational Behaviour, McGraw-Hill, 12 Th edition 2011
2. P Subba Ran, Organisational Behaviour, Himalya Publishing House 2017

**Reference Books:**

- McShane, Organizational Behaviour, TMH 2009
- Nelson, Organisational Behaviour, Thomson, 2009.
- Robbins, P. Stephen, Timothy A. Judge, Organisational Behaviour, Pearson 2009.
- Aswathappa, Organisational Behaviour, Himalaya, 2009

**Online Learning Resources:**

<httphttps://www.slideshare.net/Knight1040/organizational-culture-9608857s://www.slideshare.net/AbhayRajpoot3/motivation-165556714>

<https://www.slideshare.net/harshrastogi1/group-dynamics-159412405>

<https://www.slideshare.net/vanyasingla1/organizational-change-development-26565951>

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR****B.Tech-CSE – II-II Sem**

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**20A52303 Business Environment****(Common to All branches of Engineering)****Course Objectives:**

- To make the student to understand about the business environment
- To enable them in knowing the importance of fiscal and monetary policy
- To facilitate them in understanding the export policy of the country
- To impart knowledge about the functioning and role of WTO
- To encourage the student in knowing the structure of stock markets

**Course Outcomes (CO):**

- Define Business Environment and its Importance.
- Understand various types of business environment.
- Apply the knowledge of Money markets in future investment
- Analyse India's Trade Policy
- Evaluate fiscal and monetary policy
- Develop a personal synthesis and approach for identifying business opportunities

**UNIT - I                      Overview of Business Environment**

Introduction – meaning Nature, Scope, significance, functions and advantages. Types-Internal & External, Micro and Macro. Competitive structure of industries -Environmental analysis-advantages & limitations of environmental analysis& Characteristics of business.

**UNIT - II                      Fiscal & Monetary Policy**

Introduction – Nature, meaning, significance, functions and advantages. Public Revenues - Public Expenditure - Evaluation of recent fiscal policy of GOI. Highlights of Budget- Monetary Policy - Demand and Supply of Money –RBI -Objectives of monetary and credit policy - Recent trends- Role of Finance Commission.

**UNIT - III                      India's Trade Policy**

Introduction – Nature, meaning, significance, functions and advantages. 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.

**UNIT - IV                      World Trade Organization**

Introduction – Nature, significance, functions and advantages. Organization and Structure - Role and functions of WTO in promoting world trade - GATT -Agreements in the Uruguay Round –TRIPS, TRIMS - Disputes Settlement Mechanism - Dumping and Anti-dumping Measures.

UNIT - V                      **Money Markets and Capital Markets**

Introduction – Nature, meaning, significance, functions and advantages. 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, Introduction to international finance.

**Textbooks:**

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.

**Online Learning Resources:**

<https://www.slideshare.net/ShompaDhali/business-environment-53111245>

<https://www.slideshare.net/rbalsells/fiscal-policy-ppt>

<https://www.slideshare.net/aguness/monetary-policy-presentationppt>

<https://www.slideshare.net/DaudRizwan/monetary-policy-of-india-69561982>

<https://www.slideshare.net/ShikhaGupta31/indias-trade-policyppt>

<https://www.slideshare.net/viking2690/wto-ppt-60260883>

<https://www.slideshare.net/prateeknepal3/ppt-mo>

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR****B.Tech-CSE – II-II Sem****L T P C  
0 0 3 1.5****20A05401P Database Management Systems Laboratory****(Common to CSE, IT, CSE( DS), CSE (IoT), CSE (AI), CSE (AI & ML) and AI & DS)**

Course Objectives:

- To implement the basic knowledge of SQL queries and relational algebra.
- To construct database models for different database applications.
- To apply normalization techniques for refining of databases.
- To practice various triggers, procedures, and cursors using PL/SQL.
- To design and implementation of a database for an organization

Course Outcomes (CO):

After completion of the course, students will be able to

- Design database for any real world problem
- Implement PL/SQL programs
- Define SQL queries
- Decide the constraints
- Investigate for data inconsistency

List of Experiments:

**Week-1: CREATION OF TABLES**

1. Create a table called Employee with the following structure.

<b>Name</b>	<b>Type</b>
Empno	Number
Ename	Varchar2(20)
Job	Varchar2(20)
Mgr	Number
Sal	Number

- a. Add a column commission with domain to the Employee table.
- b. Insert any five records into the table.
- c. Update the column details of job
- d. Rename the column of Employ table using alter command.
- e. Delete the employee whose empno is 19.

2. Create department table with the following structure.

<b>Name</b>	<b>Type</b>
Deptno	Number
Deptname	Varchar2(20)
location	Varchar2(20)

- a. Add column designation to the department table.
- b. Insert values into the table.
- c. List the records of emp table grouped by deptno.
- d. Update the record where deptno is 9.
- e. Delete any column data from the table

3. Create a table called Customertable



Name	Type
Cust name	Varchar2(20)
Cust street	Varchar2(20)
Cust city	Varchar2(20)

- a. Insert records into the table.
- b. Add salary column to the table.
- c. Alter the table column domain.
- d. Drop salary column of the customer table.
- e. Delete the rows of customer table whose cust\_city is 'hyd'.
- f. Create a table called branch table.

Name	Type
Branch name	Varchar2(20)
Branch city	Varchar2(20)
asserts	Number

4. Increase the size of data type for asserts to the branch.
  - a. Add and drop a column to the branch table.
  - b. Insert values to the table.
  - c. Update the branch name column
  - d. Delete any two columns from the table

5. Create a table called sailor table

Name	Type
Sid	Number
Sname	Varchar2(20)
rating	Varchar2(20)

- a. Add column age to the sailor table.
- b. Insert values into the sailor table.
- c. Delete the row with rating > 8.
- d. Update the column details of sailor.
- e. Insert null values into the table.

6. Create a table called reserves table

Name	Type
Boat id	Integer
sid	Integer
day	Integer

- a. Insert values into the reservestable.

- b. Add column time to the reservestable.
- c. Alter the column day data type to date.
- d. Drop the column time in the table.
- e. Delete the row of the table with some condition.

### Week-2: QUERIES USING DDL AND DML

1.
  - a. Create a user and grant all permissions to the user.
  - b. Insert the any three records in the employee table and use rollback. Check the result.
  - c. Add primary key constraint and not null constraint to the employee table.
  - d. Insert null values to the employee table and verify the result.
2.
  - a. Create a user and grant all permissions to the user.
  - b. Insert values in the department table and use commit.
  - c. Add constraints like unique and not null to the department table.
  - d. Insert repeated values and null values into the table.
3.
  - a. Create a user and grant all permissions to the user.
  - b. Insert values into the table and use commit.
  - c. Delete any three records in the department table and use rollback.
  - d. Add constraint primary key and foreign key to the table.
4.
  - a. Create a user and grant all permissions to the user.
  - b. Insert records in the sailor table and use commit.
  - c. Add save point after insertion of records and verify save point.
  - d. Add constraints not null and primary key to the sailor table.
5.
  - a. Create a user and grant all permissions to the user.
  - b. Use revoke command to remove user permissions.
  - c. Change password of the user created.
  - d. Add constraint foreign key and not null.
6.
  - a. Create a user and grant all permissions to the user.
  - b. Update the table reserves and use savepoint and rollback.
  - c. Add constraint primary key, foreign key and not null to the reserves table.
  - d. Delete constraint not null to the table column.

### Week-3: QUERIES USING AGGREGATE FUNCTIONS

1.
  - a. By using the group by clause, display the enames who belongs to deptno 10 along with average salary.
  - b. Display lowest paid employee details under each department.
  - c. Display number of employees working in each department and their department number.
  - d. Using built in functions, display number of employees working in each department and their department name from dept table. Insert deptname to dept table and insert deptname for each row, do the required thing specified above.
  - e. List all employees which start with either B or C.
  - f. Display only these ename of employees where the maximum salary is greater than or equal to 5000.
2.
  - a. Calculate the average salary for each different job.
  - b. Show the average salary of each job excluding manager.
  - c. Show the average salary for all departments employing more than three people.
  - d. Display employees who earn more than the lowest salary in department 30.
  - e. Show that value returned by sign (n) function.
  - f. How many days between day of birth to current date.
3.
  - a. Show that two substring as single string.

- b. List all employee names, salary and 15% rise insalary.
  - c. Display lowest paid emp details under eachmanager
  - d. Display the average monthly salary bill for eachdeptno.
  - e. Show the average salary for all departments employing more than twopeople.
  - f. By using the group by clause, display the eid who belongs to deptno 05 along withaverage salary.
4.
    - a. Count the number of employees in department20
    - b. Find the minimum salary earned byclerk.
    - c. Find minimum, maximum, average salary of allemployees.
    - d. List the minimum and maximum salaries for each jobtype.
    - e. List the employee names in descendingorder.
    - f. List the employee id, names in ascending order byempid.
  5.
    - a. Find the sids ,names of sailors who have reserved all boats called“INTERLAKE  
Find the age of youngest sailor who is eligible to vote for each rating level with at least two such sailors.
    - b. Find the sname , bid and reservation date for eachreservation.
    - c. Find the ages of sailors whose name begin and end with B and has at least 3characters.
    - d. List in alphabetic order all sailors who have reserved redboat.
    - e. Find the age of youngest sailor for each ratinglevel.
  6.
    - a. List the Vendors who have delivered products within 6 months from orderdate.
    - b. Display the Vendor details who have supplied both Assembled and Subparts.
    - c. Display the Sub parts by grouping the Vendor type (Local or NonLocal).
    - d. Display the Vendor details in ascendingorder.
    - e. Display the Sub part which costs more than any of the Assembledparts.
    - f. Display the second maximum cost Assembledpart

#### Week-4: PROGRAMS ON PL/SQL

1.
  - a. Write a PL/SQL program to swaptwonumbers.
  - b. Write a PL/SQL program to find the largest of threenumbers.
2.
  - a. Write a PL/SQL program to find the total and average of 6 subjects and display thegrade.
  - b. Write a PL/SQL program to find the sum of digits in a givennumber.
3.
  - a. Write a PL/SQL program to display the number in reverseorder.
  - b. Writea PL/SQLprogramtocheckwhetherthegivennumberisprimeornot.
4.
  - a. Write a PL/SQL program to find the factorial of a givennumber.
  - b. Write a PL/SQL code block to calculate the area of a circle for a value of radius varying from 3 to 7. Store the radius and the corresponding values of calculated area in an empty table named areas, consisting of two columns radius andarea.
5.
  - a. Write a PL/SQL program to accept a string and remove the vowels from the string. (When ‘hello’ passed to the program it should display ‘Hll’ removing e and o from the worldHello).
  - b. Write a PL/SQL program to accept a number and a divisor. Make sure the divisor is less than or equal to 10. Else display an error message. Otherwise Display the remainderin words.

#### Week-5: PROCEDURES AND FUNCTIONS

1. Write a function to accept employee number as parameter and return Basic +HRA together as single column.
2. Accept year as parameter and write a Function to return the total net salary spent for a givenyear.
3. Create a function to find the factorial of a given number and hence findNCR.
4. Write a PL/SQL block o pint prime Fibonacci series using localfunctions.
5. Create a procedure to find the lucky number of a given birthdate.
6. Create function to the reverse of givennumber

#### Week-6: TRIGGERS

1. Create a row level trigger for the customers table that would fire for INSERT or UPDATE or DELETE operations performed on the CUSTOMERS table. This trigger will display the salary difference between the old values and newvalues:

CUSTOMERS table:

ID	NAME	AGE	ADDRESS	SALARY
1	Alive	24	Khammam	2000
2	Bob	27	Kadappa	3000
3	Catri	25	Guntur	4000
4	Dena	28	Hyderabad	5000
5	Eeshwar	27	Kurnool	6000
6	Farooq	28	Nellore	7000

- Creation of insert trigger, delete trigger, update trigger practice triggers using the passenger database.  
 Passenger( Passport\_ id INTEGER PRIMARY KEY, Name VARCHAR (50) NotNULL, Age Integer Not NULL, Sex Char, Address VARCHAR (50) NotNULL);
  - Write a Insert Trigger to check the Passport\_id is exactly six digits ornot.
  - Write a trigger on passenger to display messages '1 Record is inserted', '1 record is deleted', '1 record is updated' when insertion, deletion and updation are done on passengerrespectively.
- Insert row in employee table using Triggers. Every trigger is created with name any trigger have same name must be replaced by new name. These triggers can raised before insert, update or delete rows on data base. The main difference between a trigger and a stored procedure is that the former is attached to a table and is only fired when an INSERT, UPDATE or DELETEoccurs.
- Convert employee name into uppercase whenever an employee record is inserted or updated. Trigger to fire before the insert orupdate.
- Trigger before deleting a record from emp table. Trigger will insert the row to be deleted into table called delete \_emp and also record user who has deleted the record and date and time ofdelete.
- Create a transparent audit system for a table CUST\_MSTR. The system must keep track of the records that are being deleted orupdated

### Week-7:PROCEDURES

- Create the procedure for palindrome of givennumber.
- Create the procedure for GCD: Program should load two registers with two Numbers and then apply the logic for GCD of two numbers. GCD of two numbers is performed by dividing the greater number by the smaller number till the remainder is zero. If it is zero, the divisor is the GCD if not the remainder and the divisors of the previous division are the new set of two numbers. The process is repeated by dividing greater of the two numbers by the smaller number till the remainder is zero and GCD isfound.
- Write the PL/SQL programs to create the procedure for factorial of givennumber.
- Write the PL/SQL programs to create the procedure to find sum of N naturalnumber.
- Write the PL/SQL programs to create the procedure to find Fibonacciseries.
- Write the PL/SQL programs to create the procedure to check the given number is perfect ornot

### Week-8: CURSORS

- Write a PL/SQL block that will display the name, dept no, salary of fist highest paidemployees.
- Update the balance stock in the item master table each time a transaction takes place in the item transaction table. The change in item master table depends on the item id is already present in the item master then update operation is performed to decrease the balance stock by the quantity specified in the item transaction in case the item id is not present in the item master table then the record is inserted in the item mastertable.
- Write a PL/SQL block that will display the employee details along with salary usingcursors.
- To write a Cursor to display the list of employees who are working as a ManagersorAnalyst.
- To write a Cursor to find employee with given job anddeptno.
- Write a PL/SQL block using implicit cursor that will display message, the salaries of all the employees in the 'employee' table are updated. If none of the employee's salary are updated we getamessage 'None of the salaries were updated'. Else we get a message like for example, 'Salaries for 1000 employees are updated' if there are 1000 rows in 'employee' table

**Week-9: CASE STUDY: BOOK PUBLISHING COMPANY**

A publishing company produces scientific books on various subjects. The books are written by authors who specialize in one particular subject. The company employs editors who, not necessarily being specialists in a particular area, each take sole responsibility for editing one or more publications.

A publication covers essentially one of the specialist subjects and is normally written by a single author. When writing a particular book, each author works with one editor, but may submit another work for publication to be supervised by other editors. To improve their competitiveness, the company tries to employ a variety of authors, more than one author being a specialist in a particular subject for the above case study, do the following:

1. Analyze the data required.
2. Normalize the attributes.

Create the logical data model using E-R diagrams

**Week-10: CASE STUDY GENERAL HOSPITAL**

A General Hospital consists of a number of specialized wards (such as Maternity, Pediatric, Oncology, etc.). Each ward hosts a number of patients, who were admitted on the recommendation of their own GP and confirmed by a consultant employed by the Hospital. On admission, the personal details of every patient are recorded. A separate register is to be held to store the information of the tests undertaken and the results of a prescribed treatment. A number of tests may be conducted for each patient. Each patient is assigned to one leading consultant but may be examined by another doctor, if required. Doctors are specialists in some branch of medicine and may be leading consultants for a number of patients, not necessarily from the same ward. For the above case study, do the following.

1. Analyze the data required.
2. Normalize the attributes.

Create the logical data model using E-R diagrams

**Week-11: CASE STUDY: CAR RENTAL COMPANY**

A database is to be designed for a car rental company. The information required includes a description of cars, subcontractors (i.e. garages), company expenditures, company revenues and customers. Cars are to be described by such data as: make, model, year of production, engine size, fuel type, number of passengers, registration number, purchase price, purchase date, rent price and insurance details. It is the company policy not to keep any car for a period exceeding one year. All major repairs and maintenance are done by subcontractors (i.e. franchised garages), with whom CRC has long-term agreements. Therefore the data about garages to be kept in the database includes garage names, addresses, range of services and the like. Some garages require payments immediately after a repair has been made; with others CRC has made arrangements for credit facilities. Company expenditures are to be registered for all outgoing connected with purchases, repairs, maintenance, insurance etc. Similarly the cash inflow coming from all sources: Car hire, car sales, insurance claims must be kept of file. CRC maintains a reasonably stable client base. For this privileged category of customers special credit card facilities are provided. These customers may also book in advance a particular car. These reservations can be made for any period of time up to one month. Casual customers must pay a deposit for an estimated time of rental, unless they wish to pay by credit card. All major credit cards are accepted. Personal details such as name, address, telephone number, driving license, number about each customer are kept in the database. For the above case study, do the following:

1. Analyze the data required.
2. Normalize the attributes.

Create the logical data model using E-R diagrams

**Week-12: CASE STUDY: STUDENT PROGRESS MONITORING SYSTEM**

A database is to be designed for a college to monitor students' progress throughout their course of study. The students are reading for a degree (such as BA, BA (Hons.) M.Sc., etc) within the framework of the modular system. The college provides a number of modules, each being

characterized by its code, title, credit value, module leader, teaching staff and the department they come from. A module is coordinated by a module leader who shares teaching duties with one or more lecturers. A lecturer may teach (and be a module leader for) more than one module. Students are free to choose any module they wish but the following rules must be observed: Some modules require pre-requisites modules and some degree programs have compulsory modules. The database is also to contain some information about students including their numbers, names, addresses, degree they read for, and their past performance i.e. modules taken and examination results. For the above case study, do the following:

1. Analyze the data required.
2. Normalize the attributes.
3. Create the logical data model i.e., ER diagrams.
4. Comprehend the data given in the case study by creating respective tables with primary keys and foreign keys wherever required.
5. Insert values into the tables created (Be vigilant about Master- Slave tables).
6. Display the Students who have taken M.Sc course
7. Display the Module code and Number of Modules taught by each Lecturer.
8. Retrieve the Lecturer names who are not Module Leaders.
9. Display the Department name which offers 'English' module.
10. Retrieve the Prerequisite Courses offered by every Department (with Department names).
11. Present the Lecturer ID and Name who teaches 'Mathematics'.
12. Discover the number of years a Module is taught.
13. List out all the Faculties who work for 'Statistics' Department.
14. List out the number of Modules taught by each Module Leader.
15. List out the number of Modules taught by a particular Lecturer.
16. Create a view which contains the fields of both Department and Module tables. (Hint- The fields like Module code, title, credit, Department code and its name).
17. Update the credits of all the prerequisite courses to 5. Delete the Module 'History' from the Module table.

#### References:

1. Ramez Elmasri, Shamkant, B. Navathe, "Database Systems", Pearson Education, 6th Edition, 2013.
2. Peter Rob, Carles Coronel, "Database System Concepts", Cengage Learning, 7th Edition, 2008.

#### Online Learning Resources/Virtual Labs:

<http://www.scoopworld.in>

<http://vlabs.iitb.ac.in/vlabs-dev/labs/dblab/index.php>

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**20A05402P OPERATING SYSTEMS LAB**

**(Common to CSE, IT, CSE( DS), CSE (IoT), CSE (AI), CSE (AI & ML) and AI & DS)**

**Pre-requisite            Basics of CO and DBMS**

Course Objectives:

- To familiarize students with the architecture of OS.
- To provide necessary skills for developing and debugging CPU Scheduling algorithms.
- To elucidate the process management and scheduling and memory management.
- To explain the working of an OS as a resource manager, file system manager, process manager, memory manager, and page replacement tool.
- To provide insights into system calls, file systems and deadlock handling.

Course Outcomes (CO):

After completion of the course, students will be able to

- Trace different CPU Scheduling algorithms (L2).
- Implement Bankers Algorithms to Avoid and prevent the Dead Lock (L3).
- Evaluate Page replacement algorithms (L5).
- Illustrate the file organization techniques (L4).
- Illustrate shared memory process (L4).
- Design new scheduling algorithms (L6)

List of Experiments:

1. Practicing of Basic UNIX Commands.
2. Write programs using the following UNIX operating system calls  
Fork, exec, getpid, exit, wait, close, stat, opendir and readdir
3. Simulate UNIX commands like cp, ls, grep, etc.,
4. Simulate the following CPU scheduling algorithms  
a) Round Robin b) SJF c) FCFS d) Priority
5. Implement a dynamic priority scheduling algorithm.
6. Assume that there are five jobs with different weights ranging from 1 to 5. Implement round robin algorithm with time slice equivalent to weight.
7. Implement priority scheduling algorithm. While executing, no process should wait for more

than 10 seconds. If the waiting time is more than 10 seconds that process has to be executed for at least 1 second before waiting again.

8. Control the number of ports opened by the operating system with
  - a) Semaphore b) Monitors.
9. Simulate how parent and child processes use shared memory and address space.
10. Simulate sleeping barber problem.
11. Simulate dining philosopher's problem.
12. Simulate producer-consumer problem using threads.
13. Implement the following memory allocation methods for fixed partition
  - a) First fit b) Worst fit c) Best fit
14. Simulate the following page replacement algorithms
  - a) FIFO b) LRU c) LFU etc.,
15. Simulate Paging Technique of memory management
16. Simulate Bankers Algorithm for Dead Lock avoidance and prevention
17. Simulate the following file allocation strategies
  - a) Sequential b) Indexed c) Linked
18. Simulate all File Organization Techniques
  - a) Single level directory b) Two level c) Hierarchical d) DAG

References:

1. "Operating System Concepts", Abraham Silberchatz, Peter B. Galvin, Greg Gagne, Eighth Edition, John Wiley.
2. "Operating Systems: Internals and Design Principles", Stallings, Sixth Edition–2009, Pearson Education
3. "Modern Operating Systems", Andrew S Tanenbaum, Second Edition, PHI.
4. "Operating Systems", S.Haldar, A.A.Aravind, Pearson Education.
5. "Principles of Operating Systems", B.L.Stuart, Cengage learning, India Edition.2013-2014
6. "Operating Systems", A.S.Godbole, Second Edition, TMH.
7. "An Introduction to Operating Systems", P.C.P. Bhatt, PHI.

Online Learning Resources/Virtual Labs:

<https://www.cse.iitb.ac.in/~mythili/os/>

<http://peterindia.net/OperatingSystems.html>



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**20A05403P SOFTWARE ENGINEERING LAB**

**(Common to CSE, IT, CSE( DS), CSE (IoT))**

Course Objectives:

- To learn and implement the fundamental concepts of Software Engineering.
- To explore functional and non-functional requirements through SRS.
- To practice the various design diagrams through the appropriate tool.
- To learn to implement various software testing strategies.

Course Outcomes (CO):

After completion of the course, students will be able to

- Acquaint with historical and modern software methodologies
- Understand the phases of software projects and practice the activities of each phase
- Practice clean coding
- Take part in project management
- Adopt skills such as distributed version control, unit testing, integration testing, build management, and deployment

List of Experiments:

- 1 Draw the Work Breakdown Structure for the system to be automated
- 2 Schedule all the activities and sub-activities Using the PERT/CPM charts
- 3 Define use cases and represent them in use-case document for all the stakeholders of the system to be automated
- 4 Identify and analyze all the possible risks and its risk mitigation plan for the system to be automated
- 5 Diagnose any risk using Ishikawa Diagram (Can be called as Fish Bone Diagram or Cause& Effect Diagram)
- 6 Define Complete Project plan for the system to be automated using Microsoft Project Tool
- 7 Define the Features, Vision, Business objectives, Business rules and stakeholders in the vision document
- 8 Define the functional and non-functional requirements of the system to be automated by using Use cases and document in SRS document
- 9 Define the following traceability matrices :
  1. Use case Vs. Features
  2. Functional requirements Vs. Usecases
- 10 Estimate the effort using the following methods for the system to be automated:

1. Function point metric
2. Usecase point metric

- 11 Develop a tool which can be used for quantification of all the non-functional requirements
- 12 Write C/C++/Java/Python program for classifying the various types of coupling.
- 13 Write a C/C++/Java/Python program for classifying the various types of cohesion.
- 14 Write a C/C++/Java/Python program for object oriented metrics for design proposed by Chidamber and Kremer. (Popularly called CK metrics)
- 15 Convert the DFD into appropriate architecture styles.
- 16 Draw a complete class diagram and object diagrams using Rational tools
- 17 Define the design activities along with necessary artifacts using Design Document.
- 18 Reverse Engineer any object-oriented code to an appropriate class and object diagrams.
- 19 Test a piece of code that executes a specific functionality in the code to be tested and asserts a certain behavior or state using Junit.
- 20 Test the percentage of code to be tested by unit test using any code coverage tools
- 21 Define appropriate metrics for at least 3 quality attributes for any software application of your interest.
- 22 Define a complete call graph for any C/C++ code. (Note: The student may use any tool that generates call graph for source code)

References:

1. Software Engineering? A Practitioner's Approach, Roger S. Pressman, 1996, MGH.
2. Software Engineering by Ian Sommerville, Pearson Edu, 5th edition, 1999
3. An Integrated Approach to software engineering by Pankaj Jalote , 1991 Narosa

Online Learning Resources/Virtual Labs:

<http://vlabs.iitkgp.ac.in/se/>

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**20A05404 Exploratory Data Analytics with R**

(Common to CSE, CSE (AI), CSE (AI & ML) and AI& DS)

**Pre-requisite**                      Fundamental Programming

Course Objectives:

**The students will be able to learn:**

- How to manipulate data within R and to create simple graphs and charts used in introductory statistics.
- The given data using different distribution functions in R.
- The hypothesis testing and calculate confidence intervals; perform linear regression models for data analysis.
- The relevance and importance of the theory in solving practical problems in the real world.

Course Outcomes (CO):

After completion of the course, students will be able to

- Install and use R for simple programming tasks.
- Extend the functionality of R by using add-on packages
- Extract data from files and other sources and perform various data manipulation tasks on them.
- Explore statistical functions in R.
- Use R Graphics and Tables to visualize results of various statistical operations on data.
- Apply the knowledge of R gained to data Analytics for real-life applications.

List of Experiments:

**1: INTRODUCTION TO COMPUTING**

- a. Installation of R
- b. The basics of R syntax, workspace
- c. Matrices and lists
- d. Subsetting
- e. System-defined functions; the help system
- f. Errors and warnings; coherence of the workspace

**2: GETTING USED TO R: DESCRIBING DATA**

- a. Viewing and manipulating Data
- b. Plotting data
- c. Reading the data from console, file (.csv) local disk and web
- d. Working with larger datasets

**3: SHAPE OF DATA AND DESCRIBING RELATIONSHIPS**

- a. Tables, charts and plots.
- b. Univariate data, measures of central tendency, frequency distributions, variation, and Shape.
- c. Multivariate data, relationships between a categorical and a continuous variable,
- d. Relationship between two continuous variables – covariance, correlation coefficients, comparing multiple correlations.
- e. Visualization methods – categorical and continuous variables, two categorical variables, two continuous variables.

#### **4: PROBABILITY DISTRIBUTIONS**

- a. Sampling from distributions – Binomial distribution, normal distribution
- b. tTest, zTest, Chi Square test
- c. Density functions
- d. Data Visualization using ggplot – Box plot, histograms, scatter plotter, line chart, bar chart, heat maps

**5: EXPLORATORY DATA ANALYSIS** Demonstrate the range, summary, mean, variance, median, standard deviation, histogram, box plot, scatter plot using population dataset.

#### **6: TESTING HYPOTHESES**

- a. Null hypothesis significance testing
- b. Testing the mean of one sample
- c. Testing two means

#### **7: PREDICTING CONTINUOUS VARIABLES**

- a. Linear models
- b. Simple linear regression
- c. Multiple regression
- d. Bias-variance trade-off – cross-validation

#### **8: CORRELATION**

- a. How to calculate the correlation between two variables.
- b. How to make scatter plots.
- c. Use the scatter plot to investigate the relationship between two variables

#### **9: TESTS OF HYPOTHESES**

- a. Perform tests of hypotheses about the mean when the variance is known.
- b. Compute the p-value.
- c. Explore the connection between the critical region, the test statistic, and the p-value

**10: ESTIMATING A LINEAR RELATIONSHIP** Demonstration on a Statistical Model for a Linear Relationship

- a. Least Squares Estimates
- b. The R Function lm
- c. Scrutinizing the Residuals

#### **11: APPLY-TYPE FUNCTIONS**

- a. Defining user defined classes and operations, Models and methods in R
- b. Customizing the user's environment
- c. Conditional statements
- d. Loops and iterations

#### **12: STATISTICAL FUNCTIONS IN R**

- a. Write Demonstrate Statistical functions in R
- b. Statistical inference, contingency tables, chi-square goodness of fit, regression, generalized linear models, advanced modeling methods.

References:

1. SandipRakshit, “Statistics with R Programming”, McGraw Hill Education, 2018.
2. Gareth James, Daniela Witten, Trevor Hastie, Robert Tibshirani, “AN Introduction to Statistical Learning: with Applications in R”, Springer Texts in Statistics, 2017.
3. Joseph Schmuller, “Statistical Analysis with R for Dummies”, Wiley, 2017.
4. K G Srinivasa, G M Siddesh, ChetanShetty, Sowmya B J, “Statistical Programming in R”, Oxford Higher Education, 2017.

Online Learning Resources/Virtual Labs:

1. [www.oikostat.ch](http://www.oikostat.ch)
2. <https://learningstatisticswithr.com/>
3. <https://www.coursera.org/learn/probability-intro#syllabus>
4. <https://www.isibang.ac.in/~athreya/psweur/>

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR****B.Tech-CSE – II-II Sem**

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**20A99401 Design Thinking for Innovation  
(Common to All branches of Engineering)**

**Course Objectives:**

The objective of this course is to familiarize students with design thinking process as a tool for breakthrough innovation. It aims to equip students with design thinking skills and ignite the minds to create innovative ideas, develop solutions for real-time problems.

**Course Outcomes (CO):**

- Define the concepts related to design thinking.
- Explain the fundamentals of Design Thinking and innovation
- Apply the design thinking techniques for solving problems in various sectors.
- Analyse to work in a multidisciplinary environment
- Evaluate the value of creativity
- Formulate specific problem statements of real time issues

**UNIT - I Introduction to Design Thinking 10 Hrs**

Introduction to elements and principles of Design, basics of design-dot, line, shape, form as fundamental design components. Principles of design. Introduction to design thinking, history of Design Thinking, New materials in Industry.

**UNIT - II Design Thinking Process 10 Hrs**

Design thinking process (empathize, analyze, idea & prototype), implementing the process in driving inventions, design thinking in social innovations. Tools of design thinking - person, customer, journey map, brain storming, product development

**Activity:** Every student presents their idea in three minutes, Every student can present design process in the form of flow diagram or flow chart etc. Every student should explain about product development.

**UNIT - III Innovation 8 Hrs**

Art of innovation, Difference between innovation and creativity, role of creativity and innovation in organizations. Creativity to Innovation. Teams for innovation, Measuring the impact and value of creativity.

**Activity:** Debate on innovation and creativity, Flow and planning from idea to innovation, Debate on value-based innovation.

**UNIT - IV Product Design 8 Hrs**

Problem formation, introduction to product design, Product strategies, Product value, Product planning, product specifications. Innovation towards product design Case studies.

**Activity:** Importance of modelling, how to set specifications, Explaining their own product design.

**UNIT - V Design Thinking in Business Processes 10 Hrs**

Design Thinking applied in Business & Strategic Innovation, Design Thinking principles that redefine business – Business challenges: Growth, Predictability, Change, Maintaining Relevance, Extreme competition, Standardization. Design thinking to meet corporate needs. Design thinking for Startups. Defining and testing Business Models and Business Cases. Developing & testing prototypes.

**Activity:** How to market our own product, About maintenance, Reliability and plan for startup.

**Textbooks:**

1. Change by design, Tim Brown, Harper Collins (2009)
2. Design Thinking for Strategic Innovation, Idris Mootee, 2013, John Wiley & Sons.

**Reference Books:**

1. Design Thinking in the Classroom by David Lee, Ulysses press
2. Design the Future, by Shrrutin N Shetty, Norton Press
3. Universal principles of design- William lidwell, kritinaholden, Jill butter.
4. The era of open innovation – chesbrough.H

**Online Learning Resources:**

<https://nptel.ac.in/courses/110/106/110106124/>

<https://nptel.ac.in/courses/109/104/109104109/>

[https://swayam.gov.in/nd1\\_noc19\\_mg60/preview](https://swayam.gov.in/nd1_noc19_mg60/preview)

## **COMMUNITY SERVICE PROJECT**

.....Experiential learning through community engagement

### **Introduction**

- Community Service Project is an experiential learning strategy that integrates meaningful community service with instruction, participation, learning and community development
- Community Service Project involves students in community development and service activities and applies the experience to personal and academic development.
- Community Service Project is meant to link the community with the college for mutual benefit. The community will be benefited with the focused contribution of the college students for the village/ local development. The college finds an opportunity to develop social sensibility and responsibility among students and also emerge as a socially responsible institution.

### **Objective**

Community Service Project should be an integral part of the curriculum, as an alternative to the 2 months of Summer Internships / Apprenticeships / On the Job Training, whenever there is an exigency when students cannot pursue their summer internships. The specific objectives are;

- To sensitize the students to the living conditions of the people who are around them,
- To help students to realize the stark realities of the society.
- To bring about an attitudinal change in the students and help them to develop societal consciousness, sensibility, responsibility and accountability
- To make students aware of their inner strength and help them to find new /out of box solutions to the social problems.
- To make students socially responsible citizens who are sensitive to the needs of the disadvantaged sections.
- To help students to initiate developmental activities in the community in coordination with public and government authorities.
- To develop a holistic life perspective among the students by making them study culture, traditions, habits, lifestyles, resource utilization, wastages and its management, social problems, public administration system and the roles and responsibilities of different persons across different social systems.

### **Implementation of Community Service Project**

- Every student should put in a 6 weeks for the Community Service Project during the summer vacation.
- Each class/section should be assigned with a mentor.
- Specific Departments could concentrate on their major areas of concern. For example, Dept. of Computer Science can take up activities related to Computer Literacy to different sections of people like - youth, women, house-wives, etc
- A log book has to be maintained by each of the student, where the activities undertaken/involved to be recorded.
- The logbook has to be countersigned by the concerned mentor/faculty incharge.
- Evaluation to be done based on the active participation of the student and grade could be awarded by the mentor/faculty member.
- The final evaluation to be reflected in the grade memo of the student.
- The Community Service Project should be different from the regular programmes of NSS/NCC/Green Corps/Red Ribbon Club, etc.



- Minor project report should be submitted by each student. An internal Viva shall also be conducted by a committee constituted by the principal of the college.
- Award of marks shall be made as per the guidelines of Internship/apprentice/ on the job training

### Procedure

- A group of students or even a single student could be assigned for a particular habitation or village or municipal ward, as far as possible, in the near vicinity of their place of stay, so as to enable them to commute from their residence and return back by evening or so.
- The Community Service Project is a twofold one –
  - First, the student/s could conduct a survey of the habitation, if necessary, in terms of their own domain or subject area. Or it can even be a general survey, incorporating all the different areas. A common survey format could be designed. This should not be viewed as a duplication of work by the Village or Ward volunteers, rather, it could be another primary source of data.
  - Secondly, the student/s could take up a social activity, concerning their domain or subject area. The different areas, could be like –
    - Agriculture
    - Health
    - Marketing and Cooperation
    - Animal Husbandry
    - Horticulture
    - Fisheries
    - Sericulture
    - Revenue and Survey
    - Natural Disaster Management
    - Irrigation
    - Law & Order
    - Excise and Prohibition
    - Mines and Geology
    - Energy
    - Internet
    - Free Electricity
    - Drinking Water

## EXPECTED OUTCOMES

### BENEFITS OF COMMUNITY SERVICE PROJECT TO STUDENTS

#### Learning Outcomes

- Positive impact on students' academic learning
- Improves students' ability to apply what they have learned in "the real world"
- Positive impact on academic outcomes such as demonstrated complexity of understanding, problem analysis, problem-solving, critical thinking, and cognitive development
- Improved ability to understand complexity and ambiguity

#### Personal Outcomes

- Greater sense of personal efficacy, personal identity, spiritual growth, and moral development
- Greater interpersonal development, particularly the ability to work well with others, and build leadership and communication skills

#### Social Outcomes

- Reduced stereotypes and greater inter-cultural understanding

- Improved social responsibility and citizenship skills
- Greater involvement in community service after graduation

#### **Career Development**

- Connections with professionals and community members for learning and career opportunities
- Greater academic learning, leadership skills, and personal efficacy can lead to greater opportunity

#### **Relationship with the Institution**

- Stronger relationships with faculty
- Greater satisfaction with college
- Improved graduation rates

#### **BENEFITS OF COMMUNITY SERVICE PROJECT TO FACULTY MEMBERS**

- Satisfaction with the quality of student learning
- New avenues for research and publication via new relationships between faculty and community
- Providing networking opportunities with engaged faculty in other disciplines or institutions
- A stronger commitment to one's research

#### **BENEFITS OF COMMUNITY SERVICE PROJECT TO COLLEGES AND UNIVERSITIES**

- Improved institutional commitment
- Improved student retention
- Enhanced community relations

#### **BENEFITS OF COMMUNITY SERVICE PROJECT TO COMMUNITY**

- Satisfaction with student participation
- Valuable human resources needed to achieve community goals
- New energy, enthusiasm and perspectives applied to community work
- Enhanced community-university relations.

#### **SUGGESTIVE LIST OF PROGRAMMES UNDER COMMUNITY SERVICE PROJECT**

The following the recommended list of projects for Engineering students. The lists are not exhaustive and open for additions, deletions and modifications. Colleges are expected to focus on specific local issues for this kind of projects. The students are expected to carry out these projects with involvement, commitment, responsibility and accountability. The mentors of a group of students should take the responsibility of motivating, facilitating, and guiding the students. They have to interact with local leadership and people and appraise the objectives and benefits of this kind of projects. The project reports shall be placed in the college website for reference. Systematic, Factual, methodical and honest reporting shall be ensured.

#### **For Engineering Students**

1. **Water facilities and drinking water availability**
2. **Health and hygiene**
3. **Stress levels and coping mechanisms**
4. **Health intervention programmes**
5. **Horticulture**
6. **Herbal plants**
7. **Botanical survey**
8. **Zoological survey**
9. **Marine products**
10. **Aqua culture**

11. Inland fisheries
12. Animals and species
13. Nutrition
14. Traditional health care methods
15. Food habits
16. Air pollution
17. Water pollution
18. Plantation
19. Soil protection
20. Renewable energy
21. Plant diseases
22. Yoga awareness and practice
23. Health care awareness programmes and their impact
24. Use of chemicals on fruits and vegetables
25. Organic farming
26. Crop rotation
27. Flourey culture
28. Access to safe drinking water
29. Geographical survey
30. Geological survey
31. Sericulture
32. Study of species
33. Food adulteration
34. Incidence of Diabetes and other chronic diseases
35. Human genetics
36. Blood groups and blood levels
37. Internet Usage in Villages
38. Android Phone usage by different people
39. Utilisation of free electricity to farmers and related issues
40. Gender ration in schooling lvel- observation.

**Complimenting the community service project the students may be involved to take up some awareness campaigns on social issues/special groups. The suggested list of programmes are;**

#### **Programmes for School Children**

1. Reading Skill Programme (Reading Competition)
2. Preparation of Study Materials for the next class.
3. Personality / Leadership Development
4. Career Guidance for X class students
5. Screening Documentary and other educational films
6. Awareness Programme on Good Touch and Bad Touch (Sexual abuse)
7. Awareness Programme on Socially relevant themes.

#### **Programmes for Women Empowerment**

1. Government Guidelines and Policy Guidelines
2. Womens' Rights
3. Domestic Violence
4. Prevention and Control of Cancer
5. Promotion of Social Entrepreneurship

#### **General Camps**

1. General Medical camps
2. Eye Camps
3. Dental Camps
4. Importance of protected drinking water
5. ODF awareness camp
6. Swatch Bharath
7. AIDS awareness camp
8. Anti Plastic Awareness
9. Programmes on Environment
10. Health and Hygiene
11. Hand wash programmes
12. Commemoration and Celebration of important days

#### **Programmes for Youth Empowerment**

1. Leadership
2. Anti-alcoholism and Drug addiction
3. Anti-tobacco
4. Awareness on Competitive Examinations
5. Personality Development

#### **Common Programmes**

1. Awareness on RTI
2. Health intervention programmes
3. Yoga
4. Tree plantation
5. Programmes in consonance with the Govt. Departments like –
  - i. Agriculture
  - ii. Health
  - iii. Marketing and Cooperation
  - iv. Animal Husbandry
  - v. Horticulture
  - vi. Fisheries
  - vii. Sericulture
  - viii. Revenue and Survey
  - ix. Natural Disaster Management
  - x. Irrigation
  - xi. Law & Order
  - xii. Excise and Prohibition
  - xiii. Mines and Geology
  - xiv. Energy

#### **Role of Students:**

- Students may not have the expertise to conduct all the programmes on their own. The students then can play a facilitator role.
- For conducting special camps like Health related, they will be coordinating with the Governmental agencies.
- As and when required the College faculty themselves act as Resource Persons.
- Students can work in close association with Non-Governmental Organizations like Lions Club, Rotary Club, etc or with any NGO actively working in that habitation.
- And also with the Governmental Departments. If the programme is rolled out, the District Administration could be roped in for the successful deployment of the programme.

- An in-house training and induction programme could be arranged for the faculty and participating students, to expose them to the methodology of Service Learning.

### **Timeline for the Community Service Project Activity**

**Duration: 8 weeks**

#### **1. Preliminary Survey (One Week)**

- A preliminary survey including the socio-economic conditions of the allotted habitation to be conducted.
- A survey form based on the type of habitation to be prepared before visiting the habitation with the help of social sciences faculty. (However, a template could be designed for different habitations, rural/urban.
- The Governmental agencies, like revenue administration, corporation and municipal authorities and village secretariats could be aligned for the survey.

#### **2. Community Awareness Campaigns (One Week)**

- Based on the survey and the specific requirements of the habitation, different awareness campaigns and programmes to be conducted, spread over two weeks of time. The list of activities suggested could be taken into consideration.

#### **3. Community Immersion Programme (Three Weeks)**

**Along with the Community Awareness Programmes**, the student batch can also work with any one of the below listed governmental agencies and work in tandem with them. This community involvement programme will involve the students in exposing themselves to the experiential learning about the community and its dynamics. Programmes could be in consonance with the Govt. Departments.

#### **4. Community Exit Report (One Week)**

- During the last week of the Community Service Project, a detailed report of the outcome of the 8 weeks work to be drafted and a copy shall be submitted to the local administration. This report will be a basis for the next batch of students visiting that particular habitation. The same report submitted to the teacher-mentor will be evaluated by the mentor and suitable marks are awarded for onward submission to the University.

Throughout the Community Service Project, a daily log-book need to be maintained by the students batch, which should be countersigned by the governmental agency representative and the teacher-mentor, who is required to periodically visit the students and guide them.

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**(20A05501T) COMPUTER NETWORKS**

**Common to CSE,IT,CSD,CSE(AI),CSE(AI&ML),AI&DS,CSE(IOT)**

**Course Objectives:**

The course is designed to

- Understand the basic concepts of Computer Networks.
- Introduce the layered approach for design of computer networks
- Expose the network protocols used in Internet environment
- Explain the format of headers of IP, TCP and UDP
- Familiarize with the applications of Internet
- Elucidate the design issues for a computer network

**Course Outcomes:**

After completion of the course, students will be able to

- Identify the software and hardware components of a computer network
- Design software for a computer network
- Develop new routing, and congestion control algorithms
- Assess critically the existing routing protocols
- Explain the functionality of each layer of a computer network
- Choose the appropriate transport protocol based on the application requirements

**UNIT I                      Computer Networks and the Internet                      Lecture 8Hrs**

What Is the Internet? The Network Edge, The Network Core, Delay, Loss, and Throughput in Packet-Switched Networks(Textbook 2), Reference Models, Example Networks, Guided Transmission Media, Wireless Transmission(Textbook 1)

**UNIT II                      The Data Link Layer, Access Networks, and LANs                      Lecture 10Hrs**

Data Link Layer Design Issues, Error Detection and Correction, Elementary Data Link Protocols, Sliding Window Protocols (Textbook 1) Introduction to the Link Layer, Error-Detection and - Correction Techniques, Multiple Access Links and Protocols, Switched Local Area Networks

Link Virtualization: A Network as a Link Layer, Data Center Networking, Retrospective: A Day in the Life of a Web Page Request (Textbook 2)

**UNIT III                      The Network Layer    Lecture 8Hrs**

Routing Algorithms, Internetworking, The Network Layer in The Internet (Textbook 1)

**UNIT IV                      The Transport Layer    Lecture 9Hrs**

Connectionless Transport: UDP (Textbook 2), The Internet Transport Protocols: TCP, Congestion Control (Textbook 1)

**UNIT V                      Principles of Network Applications    Lecture 8Hrs**

Principles of Network Applications, The Web and HTTP, Electronic Mail in the Internet, DNS—The Internet's Directory Service, Peer-to-Peer Applications Video Streaming and Content Distribution Networks (Textbook 2)

**Textbooks:**

1. Andrew S. Tanenbaum, David J. Wetherall, Computer Networks, 5<sup>th</sup> Edition, PEARSON.
2. James F. Kurose, Keith W. Ross, "Computer Networking: A Top-Down Approach", 6<sup>th</sup> edition, Pearson, 2019.

**Reference Books:**

1. Forouzan, Datacommunications and Networking, 5<sup>th</sup> Edition, McGraw Hill Publication.
2. Youlu Zheng, Shakil Akthar, "Networks for Computer Scientists and Engineers", Oxford Publishers, 2016.

**Online Learning Resources:**

<https://nptel.ac.in/courses/106105183/25>

<http://www.nptelvideos.in/2012/11/computer-networks.html>

<https://nptel.ac.in/courses/106105183/3>

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**(20A05502T) ARTIFICIAL INTELLIGENCE**  
**COMMON TO CSE,IT,CSD, CSE (DS), CSE(IOT)**

**Course Objectives:**

This course is designed to:

- Introduce Artificial Intelligence
- Teach about the machine learning environment
- Present the searching Technique for Problem Solving
- Introduce Natural Language Processing and Robotics

**Course Outcomes:**

After completion of the course, students will be able to

- Apply searching techniques for solving a problem
- Design Intelligent Agents
- Develop Natural Language Interface for Machines
- Design mini robots
- Summarize past, present and future of Artificial Intelligence

**UNIT I Introduction Lecture 9Hrs**

**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.

**UNIT II Solving Problems by searching Lecture 9 Hrs**

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 Continuous Spaces, Searching with Nondeterministic Actions, Searching with partial observations, online search agents and unknown environments.

**UNIT III Reinforcement Learning & Natural Language Processing Lecture 8Hrs**

**Reinforcement Learning:** Introduction, Passive Reinforcement Learning, Active Reinforcement Learning, Generalization in Reinforcement Learning, Policy Search, applications of RL

**Natural Language Processing:** Language Models, Text Classification, Information Retrieval, Information Extraction.

**UNIT IV Natural Language for Communication Lecture 8 Hrs**

**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.

**UNIT V**

**Robotics**

Lecture 10Hrs

**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.

**Textbooks:**

1. Stuart J.Russell, Peter Norvig, “Artificial Intelligence A Modern Approach”, 3<sup>rd</sup> 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.

**Online Learning Resources:**

<http://peterindia.net/AILinks.html>

<http://nptel.ac.in/courses/106106139/>

<https://nptel.ac.in/courses/106/105/106105152/>

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**(20A05503) FORMAL LANGUAGES AND AUTOMATA THEORY**

**Course Objectives:**

This course is designed to:

- Introduce languages, grammar, and computational models
- Explain the Context Free Grammars
- Enable the students to use Turing machines
- Demonstrate decidability and un-decidability for NP-Hard problems

**Course Outcomes:**

After completion of the course, students will be able to

- List types of Turing Machines
- Design Turing Machine
- Formulate decidability and undesirability problems

**UNIT I                      Finite Automata**

Why Study Automata Theory? The Central Concepts of Automata Theory, Automation, Finite Automata, Transition Systems, Acceptance of a String by a Finite Automaton, DFA, Design of DFAs, NFA, Design of NFA, Equivalence of DFA and NFA, Conversion of NFA into DFA, Finite Automata with E-Transition, Minimization of Finite Automata, Mealy and Moore Machines, Applications and Limitation of Finite Automata.

**UNIT II                      Regular Expressions**

Regular Expressions, Regular Sets, Identity Rules, Equivalence of two Regular Expressions, Manipulations of Regular Expressions, Finite Automata, and Regular Expressions, Inter Conversion, Equivalence between Finite Automata and Regular Expressions, Pumping Lemma, Closers Properties, Applications of Regular Expressions, Finite Automata and Regular Grammars, Regular Expressions and Regular Grammars.

**UNIT III                      Context Free Grammars**

Formal Languages, Grammars, Classification of Grammars, Chomsky Hierarchy Theorem, Context-Free Grammar, Leftmost and Rightmost Derivations, Parse Trees, Ambiguous Grammars, Simplification of Context Free Grammars-Elimination of Useless Symbols, E-Productions and Unit Productions, Normal Forms for Context Free Grammars-Chomsky Normal Form and Greibach

Normal Form, Pumping Lemma, Closure Properties, Applications of Context Free Grammars.

#### **UNIT IV                    Pushdown Automata**

Pushdown Automata, Definition, Model, Graphical Notation, Instantaneous Description Language Acceptance of pushdown Automata, Design of Pushdown Automata, Deterministic and Non – Deterministic Pushdown Automata, Equivalence of Pushdown Automata and Context Free Grammars Conversion, Two Stack Pushdown Automata, Application of Pushdown Automata.

#### **UNIT V                    Turing Machine**

Turing Machine, Definition, Model, Representation of Turing Machines-Instantaneous Descriptions, Transition Tables and Transition Diagrams, Language of a Turing Machine, Design of Turing Machines, Techniques for Turing Machine Construction, Types of Turing Machines, Church's Thesis, Universal Turing Machine, Restricted Turing Machine.

**Decidable and Undecidable Problems:** NP, NP-Hard and NP-Complete Problems.

#### **Textbooks:**

1. Introduction to Automata Theory, Languages and Computation, J.E.Hopcroft, R.Motwani and J.D.Ullman, 3<sup>rd</sup> Edition, Pearson, 2008.
2. Theory of Computer Science-Automata, Languages and Computation, K.L.P.Mishra and N.Chandrasekaran, 3<sup>rd</sup> Edition, PHI, 2007.

#### **Reference Books:**

1. Formal Language and Automata Theory, K.V.N.Sunitha and N.Kalyani, Pearson, 2015.
2. Introduction to Automata Theory, Formal Languages and Computation, ShyamalenduKandar, Pearson, 2013.
3. Theory of Computation, V.Kulkarni, Oxford University Press, 2013.
4. Theory of Automata, Languages and Computation, Rajendra Kumar, McGraw Hill, 2014.

#### **Online Learning Resources:**

<https://nptel.ac.in/courses/106106049/>

<https://nptel.ac.in/courses/106104028>

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR**  
**B.Tech (CSE)– III-I Sem** **L T P C**  
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**(20A05504a) SOFTWARE PROJECT MANAGEMENT**  
**(Professional Elective Course– I)**

**Course Objectives:**

This course is designed to enable the students to understand the fundamental principles of Software Project management & will also have a good knowledge of the responsibilities of a project manager and how to handle them.

**Course Outcomes:**

After completion of the course, students will be able to

- Describe the fundamentals of Project Management
- Recognize and use Project Scheduling Techniques
- Familiarize with Project Control Mechanisms
- Understand Team Management
- Recognize the importance of Project Documentation and Evaluation

**UNIT I**

Lecture 9Hrs

Conventional Software Management: The waterfall model, conventional software Management performance

Evolution of Software Economics: software Economics. Pragmatic Software Cost Estimation

Improving Software Economics: Reducing Software Product Size, Improving Software Processes, Improving Team Effectiveness, Improving Automation, Achieving Required Quality, Peer Inspections.

**UNIT II**

Lecture 9Hrs

The old way and the new: The principles of conventional software Engineering, principles of modern software management, transitioning to an iterative process.

Life cycle phases: Engineering and production stages, inception, Elaboration, construction, transition phases.

Artifacts of the process: The artifact sets, Management artifacts, Engineering artifacts, programmatic artifacts

**UNIT III**

Lecture 9Hrs

Work Flows of the process: Software process workflows, Inter Trans workflows.

Checkpoints of the Process: Major Mile Stones, Minor Milestones, Periodic status assessments.

Iterative Process Planning: work breakdown structures, planning guidelines, cost and schedule estimating, Iteration planning process, Pragmatic planning

#### UNIT IV

Lecture 9Hrs

Process Automation: Automation Building Blocks, The Project Environment.

Project Control and Process instrumentation: The seven core Metrics, Management indicators, quality indicators

Tailoring the Process: Process discriminants. Managing people and organizing teams.

#### UNIT V

Lecture 9Hrs

Project Organizations and Responsibilities: Line-of-Business Organizations, Project Organizations, evolution of Organizations.

Future Software Project Management: modern Project Profiles, Next generation Software economics, modern process transitions.

Case Study: The Command Center Processing and Display System-Replacement (CCPDS-R)

#### **Textbooks:**

1. Software Project Management, Walker Royce, Pearson Education, 2012
2. Bob Hughes, Mike Cotterell and Rajib Mall “Software Project Management”, 6th Edition, McGraw Hill Edition, 2017

#### **Reference Books:**

1. PankajJalote, “Software Project Management in practice”, 5th Edition, Pearson Education, 2017.
2. Murali K. Chemuturi, Thomas M. Cagley Jr.” Mastering Software Project Management: Best Practices, Tools and Techniques”, J. Ross Publishing, 2010
3. Sanjay Mohapatra, “Software Project Management”, Cengage Learning, 2011

#### **Online Learning Resources:**

<http://nptel.ac.in/courses/106101061/29>

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**B.Tech (CSE)– III-I Sem**

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**(20A04702b) DIGITAL IMAGE PROCESSING**  
**(Professional Elective Course– I)**

**Course Objectives:**

This course is designed to enable the students to familiarize themselves with basic concepts of digital image processing and different image transforms and learn various image processing techniques like image enhancement, restoration, segmentation and compression

**Course Outcomes:**

After completion of the course, students will be able to

- Perform image manipulations and different digital image processing techniques
- Illustrate basic operations like – Enhancement, segmentation, compression, Image transforms and restoration techniques on image.
- Analyze pseudo and fullcolor image processing techniques.
- Apply various morphological operators on images

**UNIT I**

Lecture 8Hrs

Introduction: Introduction to Image Processing, Fundamental steps in digital image processing, components of an image processing system, image sensing and acquisition, image sampling and quantization, some basic relationships between pixels, an introduction to the mathematical tools used in digital image processing. Image Transforms: Need for image transforms, Discrete Fourier transform (DFT) of one variable, Extension to functions of two variables, some properties of the 2-D Discrete Fourier transform, Importance of Phase, Walsh Transform. Hadamard transform, Haar Transform, Slant transform, Discrete Cosine transform, KL Transform, SVD and Radon Transform, Comparison of different image transforms.

**UNIT II**

Lecture 9Hrs

Intensity Transformations and Spatial Filtering: Background, Some basic intensity transformation functions, histogram processing, fundamentals of spatial filtering, smoothing spatial filters, sharpening spatial filters, Combining spatial enhancement methods Filtering in the Frequency Domain: Preliminary concepts, The Basics of filtering in the frequency domain, image smoothing using frequency domain filters, Image Sharpening using frequency domain filters, Selective filtering.

**UNIT III**

Lecture 9Hrs

Image Restoration and Reconstruction: A model of the image degradation / Restoration process, Noise models, restoration in the presence of noise only-Spatial Filtering, Periodic Noise Reduction by frequency domain filtering, Linear, Position –Invariant Degradations, Estimating the degradation function, Inverse filtering, Minimum mean square error (Wiener) filtering, constrained least squares filtering, geometric mean filter, image reconstruction from projections.

**UNIT IV**

Lecture 8Hrs

Image compression: Fundamentals, Basic compression methods: Huffman coding, Golomb coding, Arithmetic coding, LZW coding, Run-Length coding, Symbol-Based coding, Bit-Plane coding, Block Transform coding, Predictive coding Wavelets and Multiresolution Processing: Image pyramids, subband coding, Multiresolution expansions, wavelet transforms in one dimensions & two dimensions, Wavelet coding.

Lecture 9Hrs

## UNIT V

Image segmentation: Fundamentals, point, line, edge detection, thresholding, region –based segmentation. Morphological Image Processing: Preliminaries, Erosion and dilation, opening and closing, basic morphological algorithms for boundary extraction, thinning, gray-scale morphology, Segmentation using morphological watersheds.

Color image processing: color fundamentals, color models, pseudo color image processing, basics of full color image processing, color transformations, smoothing and sharpening. Image segmentation based on color, noise in color images, color image compression.

### Textbooks:

1. R. C. Gonzalez and R. E. Woods, Digital Image Processing, 3rd edition, Prentice Hall, 2008.
2. Jayaraman, S. Esakkirajan, and T. Veerakumar, "Digital Image Processing", Tata McGraw-Hill Education, 2011.

### Reference Books:

1. Anil K.Jain, "Fundamentals of Digital Image Processing", Prentice Hall of India, 9th Edition, Indian Reprint, 2002.
2. B.Chanda, D.Dutta Majumder, "Digital Image Processing and Analysis", PHI, 2009

### Online Learning Resources:

<https://nptel.ac.in/courses/117105079>

<https://nptel.ac.in/courses/117105135>

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR**  
**B.Tech (CSE)– III-I Sem** **L T P C**  
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**(20A05504c) BIG DATA TECHNOLOGIES**  
**Common to CSE, IT, CSE(AI), CSE(AI&ML),AI&DS**  
 (Professional Elective Course– I)

**Course Objectives:**

To learn the big data characteristics, study challenges and Hadoop framework to handle big data.

**Course Outcomes:**

After completion of the course, students will be able to

- Understand the elements of Big data
- Use different technologies to tame Big Data
- Process Given data using Map Reduce
- Develop applications using Hive, NoSQL.

**UNIT I**

Lecture 8Hrs

Getting an Overview of Big Data: Introduction to Big Data, Structuring Big Data, Elements of Big Data, Big Data Analytics. Exploring the use of Big Data in Business Context Use of Big Data in Social Networking, Use of Big Data Preventing Fraudulent Activities, Use of Big Data in Retail Industry

**UNIT II**

Lecture 9Hrs

Introducing Technologies for Handling Big Data Distributed and Parallel Computing for Big Data, Introducing Hadoop, Cloud Computing and Big Data, In-memory Computing Technology for Big Data.

Understanding Hadoop Ecosystem Hadoop Ecosystem, Hadoop Distributed File System, Map Reduce, Hadoop YARN, Introducing HBase, Combining HBase and HDFS, Hive, Pig and Pig Latin, Sqoop, ZooKeeper, Flume, Oozie.

**UNIT III**

Lecture 9Hrs

Understanding Map Reduce Fundamentals and H Base The Map Reduce Framework, Techniques to Optimize Map Reduce Jobs, Uses of Map Reduce, Role of H Base in Big Data Processing. Processing Your Data with Map Reduce Recollecting he Concept of Map Reduce Framework, Developing Simple Map Reduce Application, Points to Consider while Designing Map Reduce.

**UNIT IV**

Lecture 8Hrs

Customizing Map Reduce Execution and Implementing Map Reduce Program Controllong Map Reduce Execution with Input Format, Reading Data with Custom Record Reader, Organizing Output Data with Output Formats, Customizing Data with Record Writer, Customizing the Map Reduce Execution in Terms of YARN, Implementing a Map Reduce Program for Sorting Text Data.



Testing and Debugging Map Reduce Application Debugging Hadoop Map Reduce Locally, Performing Unit Testing for Map Reduce Applications.

**UNIT V**

Lecture 8Hrs

Exploring Hive: Introducing Hive, Hive Service, Built-In Functions in Hive, Hive DDL, Data Manipulation in Hive, Data Retrieval Queries, Using JOINS in Hive.

NoSQL Data Management Introduction to NoSQL, Types of NoSQL Data Models, Schema-Less Databases, Materialized Views, Distribution Models, Sharding.

**Textbooks:**

1. Big Data Black Book, DT Editorial services, Dreamtech Press

**Reference Books:**

1. Data Science for Business by F. Provost and T. Fawcett, O'Reilly Media.
2. Taming the Big Data Tidal Wave: Finding Opportunities in Huge Data Streams with Advanced
3. Hadoop: The Definitive Guide by Tom White, O'Reilly Media.
4. Big Data and Business Analytics by Jay Liebowitz, Auerbach Publications, CRC Press.

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**B.Tech (CSE)– III-I Sem**

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**(20A05501P) COMPUTER NETWORKS LAB**

**Common to CSE,IT,CSD,CSE(IOT)**

**Course Objectives:**

- To understand the different types of networks
- To discuss the software and hardware components of a network
- To enlighten the working of networking commands supported by operating system
- To impart knowledge of Network simulator 2/3
- To familiarize the use of networking functionality supported by JAVA
- To familiarize with computer networking tools.

**Course Outcomes (CO):**

After completion of the course, students will be able to

- Design scripts for Wired network simulation
- Design scripts of static and mobile wireless networks simulation
- Analyze the data traffic using tools
- Design JAVA programs for client-server communication
- Construct a wired and wireless network using the real hardware

**List of Experiments:**

1. Study different types of Network cables (Copper and Fiber) and prepare cables (Straight and Cross) to connect Two or more systems. Use crimping tool to connect jacks. Use LAN tester to connect the cables.
  - Install and configure Network Devices: HUB, Switch and Routers. Consider both manageable and non-manageable switches. Do the logical configuration of the system. Set the bandwidth of different ports.
  - Install and Configure Wired and Wireless NIC and transfer files between systems in Wired LAN and Wireless LAN. Consider both adhoc and infrastructure mode of operation.
2. Work with the commands Ping, Tracert, Ipconfig, pathping, telnet, ftp, getmac, ARP, Hostname, Nbtstat, netdiag, and Nslookup
3. Find all the IP addresses on your network. Unicast, Multicast, and Broadcast on your network.
4. Use Packet tracer software to build network topology and configure using Distance vector

routing protocol.

5. Use Packet tracer software to build network topology and configure using Link State routing protocol.
6. Using JAVA RMI Write a program to implement Basic Calculator
7. Implement a Chatting application using JAVA TCP and UDP sockets.
8. Hello command is used to know whether the machine at the other end is working or not. Echo command is used to measure the round-trip time to the neighbour. Implement Hello and Echo commands using JAVA.
9. Using Wireshark perform the following operations:
  - Inspect HTTP Traffic
  - .Inspect HTTP Traffic from a Given IP Address,
  - Inspect HTTP Traffic to a Given IP Address,
  - Reject Packets to Given IP Address,
  - Monitor Apache and MySQL Network Traffic.
10. Install Network Simulator 2/3. Create a wired network using dumbbell topology. Attach agents, generate both FTP and CBR traffic, and transmit the traffic. Vary the data rates and evaluate the performance using metric throughput, delay, jitter and packet loss.
11. Create a static wireless network. Attach agents, generate both FTP and CBR traffic, and transmit the traffic. Vary the data rates and evaluate the performance using metric throughput, delay, jitter and packet loss.
12. Create a mobile wireless network. Attach agents, generate both FTP and CBR traffic, and transmit the traffic. Vary the data rates and evaluate the performance using metric throughput, delay, jitter and packet loss.

#### References:

1. ShivendraS.Panwar, Shiwen Mao, Jeong-dong Ryoo, and Yihan Li, "TCP/IP Essentials A Lab-Based Approach", Cambridge University Press, 2004.
2. Cisco Networking Academy, "CCNA1 and CCNA2 Companion Guide", Cisco Networking Academy Program, 3rd edition, 2003.
3. Elloitte Rusty Harold, "Java Network Programming", 3rd edition, O'REILLY, 2011.

#### Online Learning Resources/Virtual Labs:

<https://www.netacad.com/courses/packet-tracer> - Cisco Packet Tracer.

Ns Manual, Available at: <https://www.isi.edu/nsnam/ns/ns-documentation.html>, 2011.

[https://www.wireshark.org/docs/wsug\\_html\\_chunked/](https://www.wireshark.org/docs/wsug_html_chunked/) -Wireshark.

<https://nptel.ac.in/courses/106105183/25>

<http://www.nptelvideos.in/2012/11/computer-networks.html>

<https://nptel.ac.in/courses/106105183/3>

[http://vlabs.iitb.ac.in/vlabs-dev/labs\\_local/computer-networks/labs/explist.php](http://vlabs.iitb.ac.in/vlabs-dev/labs_local/computer-networks/labs/explist.php)

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**(20A05502P) ARTIFICIAL INTELLIGENCE LAB**

**COMMON TO CSE,IT,CSD, CSE (DS)**

**Course Objectives:**

- To teach the methods of implementing algorithms using artificial intelligence techniques
- To illustrate search algorithms

To demonstrate the building of intelligent agents

**Course Outcomes:**

After completion of the course, students will be able to

- Implement search algorithms
- Solve Artificial intelligence problems
- Design chatbot and virtual assistant

**List of Experiments:**

1. Write a program to implement DFS and BFS
2. Write a Program to find the solution for traveling salesman Problem
3. Write a program to implement Simulated Annealing Algorithm
4. Write a program to find the solution for the wumpus world problem
5. Write a program to implement 8 puzzle problem
6. Write a program to implement Towers of Hanoi problem
7. Write a program to implement A\* Algorithm
8. Write a program to implement Hill Climbing Algorithm
9. Build a Chatbot using AWS Lex, Pandora bots.
10. Build a bot that provides all the information related to your college.
11. Build a virtual assistant for Wikipedia using Wolfram Alpha and Python
12. The following is a function that counts the number of times a string occurs in another string:

```
# Count the number of times string s1 is found in string s2
```

```
Def count substring(s1,s2):
```

```
count = 0
```

```
for i in range(0,len(s2)-len(s1)+1):
```

```

if s1 == s2[i:i+len(s1)]:
    count += 1
return count

```

For instance, `countsubstring('ab','cabalaba')` returns 2.

Write a recursive version of the above function. To get the rest of a string (i.e. everything but the first character).

13. Higher order functions. Write a higher-order function `count` that counts the number of elements in a list that satisfy a given test. For instance: `count (lambda x: x>2, [1, 2, 3, 4, 5])` should return 3, as there are three elements in the list larger than 2. Solve this task without using any existing higher-order function.

14. Brute force solution to the Knapsack problem. Write a function that allows you to generate random problem instances for the knapsack program. This function should generate a list of items containing  $N$  items that each have a unique name, a random size in the range  $1 \dots 5$  and a random value in the range  $1 \dots 10$ .

Next, you should perform performance measurements to see how long the given knapsack solver take to solve different problem sizes. You should perform at least 10 runs with different randomly generated problem instances for the problem sizes 10,12,14,16,18,20 and 22. Use a backpack size of  $2:5 \times N$  for each value problem size  $N$ . Please note that the method used to generate random numbers can also affect performance, since different distributions of values can make the initial conditions of the problem slightly more or less demanding.

How much longer time does it take to run this program when we increase the number of items? Does the backpack size affect the answer?

Try running the above tests again with a backpack size of  $1 \times N$  and with  $4:0 \times N$ .

15. Assume that you are organising a party for  $N$  people and have been given a list  $L$  of people who, for social reasons, should not sit at the same table. Furthermore, assume that you have  $C$  tables (that are infinitely large).

Write a function `layout (N,C,L)` that can give a table placement (i.e. a number from  $0 : : C - 1$ ) for each guest such that there will be no social mishaps.

For simplicity we assume that you have a unique number  $0 \dots N-1$  for each guest and that the list of restrictions is of the form `[(X, Y) ...]` denoting guests  $X, Y$  that are not allowed to sit together. Answer with a dictionary mapping each guest into a table assignment, if there are no possible layouts of the guests you should answer `False`.

**References:**

1. David Poole, Alan Mackworth, Randy Goebel, "Computational Intelligence: a logical approach", Oxford University Press, 2004.
2. G. Luger, "Artificial Intelligence: Structures and Strategies for complex problem solving", Fourth Edition, Pearson Education, 2002.
3. J. Nilsson, "Artificial Intelligence: A new Synthesis", Elsevier Publishers, 1998.
4. Artificial Neural Networks, B. Yagna Narayana, PHI
5. Artificial Intelligence, 2nd Edition, E.Rich and K.Knight, TMH.
6. Artificial Intelligence and Expert Systems, Patterson, PHI.

**Online Learning Resources/Virtual Labs:**

<https://www.tensorflow.org/>

<https://pytorch.org/>

<https://github.com/pytorch>

<https://keras.io/>

<https://github.com/keras-team>

<http://deeplearning.net/software/theano/>

<https://github.com/Theano/Theano>

<https://caffe2.ai/>

<https://github.com/caffe2>

<https://deeplearning4j.org/Scikit-learn>:<https://scikit-learn.org/stable/>

<https://github.com/scikit-learn/scikit-learn>

<https://www.deeplearning.ai/>

<https://opencv.org/>

<https://github.com/qqwweee/keras-yolo3>

<https://www.pyimagesearch.com/2018/11/12/yolo-object-detection-with-opencv/>

<https://developer.nvidia.com/cuda-math-library>

[http://vlabs.iitb.ac.in/vlabs-dev/labs/machine\\_learning/labs/index.php](http://vlabs.iitb.ac.in/vlabs-dev/labs/machine_learning/labs/index.php)

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR**  
**B.Tech (CSE)– III-I Sem** **L T P C**  
**1 0 2 2**  
**(20A05506) ADVANCED WEB APPLICATION DEVELOPMENT**

**Skill Oriented Course - III**

**Course Objectives:**

- Learn how to create dynamic websites using PHP and establish database connectivity.
- Explore SMS API and session management
- Understand the common Web Application Vulnerabilities and provide Security.
- Acquire the knowledge of external libraries to generate various types of documents and files.
- Understand the difference between traditional hosting services and Cloud Hosting services

**Course Outcomes:**

After completion of the course, students will be able to

- Create dynamic websites using PHP and MySQL
- Handle Authentication using Sessions, JWT.
- Secure Web applications from common attacks like Injection, XSS.
- Integrate Libraries to dynamically generate documents, spreadsheets, pdfs, etc.
- Host Websites in traditional web hosting platforms and also Cloud based infrastructure

**Module 1:**

Introduction: Web Server, Database Server, Private IP Address, Port Address, Server-side Programming, Web Server solution stack.

Task: Installation of XAMPP/WAMP. Access a test page using a device (Laptop/Desktop/Mobile) within LAN or hotspot using its private IP address.

**Module 2:**

PHPMyAdmin: Create, Browse, Drop, Copy, Rename and Alter databases, tables, views, fields and indexes, Import data from CSV and SQL, Export (back-up) data.

Task: Design a Student Profile Data Management System for a college. Create a Database and its associated tables.

**Module 3:**

Php basics: Basic Syntax, primitive types, Variables, Constants, Expressions, Operators, Control structures, functions.

Task: Develop a PHP application and run it with a command-line interpreter

**Module 4:**

Handling HTML Forms: Predefined Variables, Reading data from web form controls like input, textarea, select etc., Handling File Uploads.

Task: Develop an Add Student Profile Page which accepts all student details including photo and display them in order.

#### **Module 5:**

Predefined Functions and Files: Arrays, Associative Arrays, Multidimensional Arrays, Array functions, String functions, Date and Time functions, File Handling: Open, Close, Create, Read, Write, Append.

Task: Implement an effective Logging System using files in PHP.

#### **Module 6:**

Classes and Objects: Creating classes and objects, Visibility, Constructor and Destructor, Inheritance, static keyword, interfaces, class Abstraction, namespaces

Task: Design and implement Class diagram representation of Student Management System for a college using PHP.

#### **Module 7:**

Database Connectivity with MySql: Establish a database Connection using mysqli, Prepare SQL Statement, Bind parameters, Execute the statement, bind the result.

Task: Develop Add Student Profile Page to store data into the database and develop a webpage to retrieve the student details based on the Roll Number or any unique ID.

#### **Module 8:**

HTTP is a Stateless Protocol: Handling Cookies and Sessions, Implementation of JSON Web Tokens (JWT), SMS API.

Task: Design and develop a User Authentication System (Login-Logout functionality) using cookies, sessions, JWT, and SMS API. Also, identify which is suitable for your application

#### **Module 9:**

Exception Handling and Security: Handle Database connectivity exceptions, SQL Injection Vulnerability, Cross-site scripting, Session hijacking, and Session fixation

Task: Secure all your PHP applications from common vulnerabilities like Injection, XSS, Session hijacking and fixation, and other exceptions

#### **Module 10:**

PHP Libraries: Read data from Excel Files, Generate dynamic Excel Files, PDF files, and Word Documents.

Task: Design an Administrator Portal through which administrators can be able to upload student data into the database, Download the student data, Generate certificates, etc.



### **Module 11:**

Hosting service provider: Public IP Address, Nameservers, Domain Name, Understand cPanel Modules: File Manager, Databases, Email Accounts, One-Click Installers, DNS, Other Configuration & Monitoring Controls.

Task: Host a PHP-MySQL based application on the internet using the Web Hosting Service Provider of your choice (000webhost, Hostinger, Heroku, Godaddy, etc.)

### **Module 12:**

Cloud Hosting: Advantages of Cloud Hosting, Creating Instances or droplets, Managing Roles, Scaling the Application, Securing the instances, Monitoring Tools, etc.

Task: Host a PHP-MySQL based application on the internet using the Cloud Hosting Provider of your choice (Amazon Web Services, Google Cloud Platform, DigitalOcean, etc.)

### **References:**

1. MacIntyre, Peter, and Tatro, Kevin. Programming PHP: Creating Dynamic Web Pages. United States, O'Reilly Media, 2020.
2. Valade, Janet. PHP and MySQL Web Development All-in-One Desk Reference For Dummies. Germany, Wiley, 2011.
3. Gulabani, Sunil. Amazon Web Services Bootcamp: Develop a Scalable, Reliable, and Highly Available Cloud Environment with AWS. United Kingdom, Packt Publishing, 2018.

### **Online Learning Resources/Virtual Labs:**

<https://www.apachefriends.org/>

<https://www.wampserver.com/en/>

<https://www.php.net/>

<https://in.godaddy.com/>

<https://www.hostinger.in/>

<https://aws.amazon.com/>

<https://cloud.google.com/>



**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR**  
**B.Tech-CSE – III-I Sem**

**L T P C**  
**3 0 0 0**

**20A99201 ENVIRONMENTAL SCIENCE**  
 (Common to All Branches of Engineering)

**Course Objectives:**

- To make the students to get awareness on environment
- To understand the importance of protecting natural resources, ecosystems for future generations and pollution causes due to the day to day activities of human life
- To save earth from the inventions by the engineers.

**Course Outcomes (CO):**

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

- Grasp multidisciplinary nature of environmental studies and various renewable and nonrenewable resources.
- Understand flow and bio-geo- chemical cycles and ecological pyramids.
- Understand various causes of pollution and solid waste management and related preventive measures.
- About the rainwater harvesting, watershed management, ozone layer depletion and waste land reclamation.
- Casus of population explosion, value education and welfare programmes.

**UNIT - I**

**8 Hrs**

**Multidisciplinary Nature Of Environmental Studies:** – Definition, Scope and Importance – Need for Public Awareness.

**Natural Resources :** 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**

**12 Hrs**

**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)

**Biodiversity And Its Conservation :** 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-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**

**8 Hrs**

**Environmental Pollution:** 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

**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

10 Hrs

**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 - V

8 Hrs

**Human Population And The Environment:** Population growth, variation among nations. Population explosion – Family Welfare Programmes. – 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.

**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, and birds – river, hill slopes, etc..

#### Textbooks:

1. Text book of Environmental Studies for Undergraduate Courses ErachBharucha for University Grants Commission, Universities Press.
2. Palaniswamy, “Environmental Studies”, Pearson education
3. S.AzeemUnnisa, “Environmental Studies” Academic Publishing Company
4. K.Raghavan Nambiar, “Text book of Environmental Studies for Undergraduate Courses as per UGC model syllabus”, Scitech Publications (India), Pvt. Ltd.

#### Reference Books:

1. Deeksha Dave and E.Sai Baba Reddy, “Textbook of Environmental Science”, Cengage Publications.
2. M.Anji Reddy, “Text book of Environmental Sciences and Technology”, BS Publication.
3. J.P.Sharma, Comprehensive Environmental studies, Laxmi publications.
4. J. Glynn Henry and Gary W. Heinke, “Environmental Sciences and Engineering”, Prentice hall of India Private limited
5. G.R.Chatwal, “A Text Book of Environmental Studies” Himalaya Publishing House
6. Gilbert M. Masters and Wendell P. Ela, “Introduction to Environmental Engineering and Science, Prentice hall of India Private limited.

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR**  
**B.Tech (CSE)– III-II Sem** **L T P C**  
**3 0 0 3**  
**(20A05601T) COMPILER DESIGN**

**Course Objectives:**

- Teach the concepts related to assemblers, loaders, linkers and editors
- Introduce the basic principles of the compiler construction
- Explain the Concept of Context Free Grammars, Parsing and various Parsing Techniques.
- Expose the process of intermediate code generation.
- Instruct the process of Code Generation and various Code optimization techniques

**Course Outcomes:**

After completion of the course, students will be able to

- Differentiate the various phases of a compiler
- Design code generator
- Apply code optimization techniques
- Identify the tokens and verify the code

**UNIT I Introduction Lecture 8Hrs**

**Introduction:** The structure of a compiler, the science of building a compiler, programming language basics

**Lexical Analysis:** The Role of the Lexical Analyzer, Input Buffering, Recognition of Tokens, The Lexical-Analyzer Generator Lex, Finite Automata, From Regular Expressions to Automata, Design of a Lexical-Analyzer Generator, Optimization of DFA-Based Pattern Matchers.

**UNIT II Syntax Analysis Lecture 9Hrs**

Introduction, Context-Free Grammars, Writing a Grammar, Top-Down Parsing, Bottom-Up Parsing, Introduction to LR Parsing: Simple LR, More Powerful LR Parsers, Using Ambiguous Grammars and Parser Generators.

**UNIT III Syntax-Directed Translation Lecture 9Hrs**

**Syntax-Directed Translation:** Syntax-Directed Definitions, Evaluation Orders for SDD's, Applications of Syntax-Directed Translation, Syntax-Directed Translation Schemes, Implementing L-Attributed SDD's.

**Intermediate-Code Generation:** Variants of Syntax Trees, Three-Address Code, Types and Declarations, Type Checking, Control Flow, Switch-Statements, Intermediate Code for Procedures.

**UNIT IV Code Generation Lecture 8Hrs**

**Run-Time Environments:** Stack Allocation of Space, Access to Nonlocal Data on the Stack, Heap Management, Introduction to Garbage Collection, Introduction to Trace-Based Collection.

**Code Generation:** Issues in the Design of a Code Generator, The Target Language, Addresses in the Target Code, Basic Blocks and Flow Graphs, Optimization of Basic Blocks, A Simple Code Generator, Peephole Optimization, Register Allocation and Assignment, Dynamic Programming Code-Generation.

**UNIT V**

**Machine-Independent Optimization**

Lecture 8Hrs

**Machine-Independent Optimization:** The Principal Sources of Optimization, Introduction to Data-Flow Analysis, Foundations of Data-Flow Analysis, Constant Propagation, Partial-Redundancy Elimination, Loops in Flow Graphs

**Textbooks:**

1. Alfred V. Aho, Monica S. Lam, Ravi Sethi, Jeffrey D. Ullman, “Compilers Principles, Techniques and Tools”, 2<sup>nd</sup> Edition, Pearson.

**Reference Books:**

1. Yunlin Su, Song Y. Yan, “Principles of Compilers”, Springer, 2012.
2. Andrew W. Appel, “Modern Compiler Implementation in JAVA”, 2<sup>nd</sup> edition, Cambridge University Press, 2004.
3. Lex & Yacc – John R. Levine, Tony Mason, Doug Brown, O’reilly
4. Compiler Construction, Loudon, Thomson.

**Online Learning Resources:**

1. <https://nptel.ac.in/courses/106108052/>
2. <http://openclassroom.stanford.edu/MainFolder/CoursePage.php?course=Compilers>

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR**  
**B.Tech (CSE)– III-II Sem** **L T P C**  
**3 0 0 3**  
**(20A05602T) MACHINE LEARNING**  
**Common to CSE, IT,CSD,CSE(AI),CSE(AI&ML),CSE(DS),AI&DS,CSE(IOT)**

**Course Objectives:**

The course is introduced for students to

- Understand basic concepts of Machine Learning
- Study different learning algorithms
- Illustrate evaluation of learning algorithms

**Course Outcomes (CO):**

After completion of the course, students will be able to

- Identify machine learning techniques suitable for a given problem
- Solve the problems using various machine learning techniques
- Design application using machine learning techniques

**UNIT I Introduction to Machine Learning & Preparing to Model** Lecture 9Hrs

Introduction: What is Human Learning? Types of Human Learning, what is Machine Learning? Types of Machine Learning, Problems Not to Be Solved Using Machine Learning, Applications of Machine Learning, State-of-The-Art Languages/Tools in Machine Learning, Issues in Machine Learning

Preparing to Model: Introduction, Machine Learning Activities, Basic Types of Data in Machine Learning, Exploring Structure of Data, Data Quality and Remediation, Data Pre-Processing

**UNIT II Modelling and Evaluation & Basics of Feature Engineering** Lecture 9Hrs

Introduction, selecting a Model, training a Model (for Supervised Learning), Model Representation and Interpretability, Evaluating Performance of a Model, Improving Performance of a Model  
 Basics of Feature Engineering: Introduction, Feature Transformation, Feature Subset Selection

**UNIT III Bayesian Concept Learning & Supervised Learning: Classification** Lecture 10Hrs

Introduction, Why Bayesian Methods are Important? Bayes' Theorem, Bayes' Theorem and Concept Learning, Bayesian Belief Network

Supervised Learning: Classification: Introduction, Example of Supervised Learning, Classification Model, Classification Learning Steps, Common Classification Algorithms- $k$ -Nearest Neighbour( $k$ NN), Decision tree, Random forest model, Support vector machines

**UNIT IV Supervised Learning: Regression** Lecture 10Hrs

Introduction, Example of Regression, Common Regression Algorithms-Simple linear regression, Multiple linear regression, Assumptions in Regression Analysis, Main Problems in Regression Analysis, Improving Accuracy of the Linear Regression Model, Polynomial Regression Model, Logistic Regression, Maximum Likelihood Estimation.

**UNIT V Unsupervised Learning** Lecture 9Hrs

Introduction, Unsupervised vs Supervised Learning, Application of Unsupervised Learning, Clustering – Clustering as a machine learning task, Different types of clustering techniques, Partitioning methods,

$K$ -Medoids: a representative object-based technique, Hierarchical clustering, Density-based methods-DBSCAN

Finding Pattern using Association Rule- Definition of common terms, Association rule, The apriori algorithm for association rule learning, Build the apriori principles rules

**Textbooks:**

1. Machine Learning, SaikatDutt, Subramanian Chandramouli, Amit Kumar Das, Pearson, 2019.

**Reference Books:**

1. EthernAlpaydin, "Introduction to Machine Learning", MIT Press, 2004.
2. Stephen Marsland, "Machine Learning -An Algorithmic Perspective", Second Edition, Chapman and Hall/CRC Machine Learning and Pattern Recognition Series,2014.
1. Andreas C. Müller and Sarah Guido "Introduction to Machine Learning with Python: A Guide for Data Scientists", Oreilly.

**Online Learning Resources:**

- Andrew Ng, "Machine Learning Yearning"
- <https://www.deeplearning.ai/machine-learning-yearning/>
- Shai Shalev-Shwartz , Shai Ben-David, "Understanding Machine Learning: From Theory to Algorithms" , Cambridge University Press  
<https://www.cse.huji.ac.il/~shais/UnderstandingMachineLearning/index.html>



**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR**  
**B.Tech (CSE)– III-II Sem** **L T P C**  
**3 0 0 3**  
**(20A05603T) INTERNET OF THINGS**

**Common to CSE, IT, CSD, CSE(AI), CSE(DS),AI&DS**

**Course Objectives:**

- Understand the basics of Internet of Things and protocols.
- Discuss the requirement of IoT technology
- Introduce some of the application areas where IoT can be applied.
- Understand the vision of IoT from a global perspective, understand its applications, determine its market perspective using gateways, devices and data management

**Course Outcomes:**

After completion of the course, students will be able to

- Understand general concepts of Internet of Things.
- Apply design concept to IoT solutions
- Analyze various M2M and IoT architectures
- Evaluate design issues in IoT applications
- Create IoT solutions using sensors, actuators and Devices

**UNIT I Introduction to IoT**

Lecture 8Hrs

Definition and Characteristics of IoT, physical design of IoT, IoT protocols, IoT communication models, IoT Communication APIs, Communication protocols, Embedded Systems, IoT Levels and Templates

**UNIT II Prototyping IoT Objects using Microprocessor/Microcontroller**

Lecture 9Hrs

Working principles of sensors and actuators, setting up the board – Programming for IoT, Reading from Sensors, Communication: communication through Bluetooth, Wi-Fi.

**UNIT III IoT Architecture and Protocols**

Lecture 8Hrs

Architecture Reference Model- Introduction, Reference Model and architecture, IoT reference Model, Protocols- 6LoWPAN, RPL, CoAP, MQTT, IoT frameworks- Thing Speak.

**UNIT IV Device Discovery and Cloud Services for IoT**

Lecture 8Hrs

Device discovery capabilities- Registering a device, Deregister a device, Introduction to Cloud Storage models and communication APIs Web-Server, Web server for IoT.

## UNIT V UAV IoT

Lecture 10Hrs

Introduction to Unmanned Aerial Vehicles/Drones, Drone Types, Applications: Defense, Civil, Environmental Monitoring; UAV elements and sensors- Arms, motors, Electronic Speed Controller(ESC), GPS, IMU, Ultra sonic sensors; UAV Software –Arudpilot, Mission Planner, Internet of Drones(IoD)- Case study FlytBase.

### Textbooks:

1. Vijay Madiseti and ArshdeepBahga, “ Internet of Things ( A Hands-on-Approach)”, 1<sup>st</sup> Edition, VPT, 2014.
2. Handbook of unmanned aerial vehicles, K Valavanis; George J Vachtsevanos, New York, Springer, Boston, Massachusetts : Credo Reference, 2014. 2016.

### Reference Books:

1. Jan Holler, VlasiosTsiatsis, Catherine Mulligan, Stefan Avesand, Stamatis Karnouskos, David Boyle, “ From Machine-to-Machine to the Internet of Things: Introduction to a New Age of Intelligence”, 1<sup>st</sup> Edition, Academic Press, 2014.
2. ArshdeepBahga, Vijay Madiseti - Internet of Things: A Hands-On Approach, Universities Press, 2014.
3. The Internet of Things, Enabling technologies and use cases – Pethuru Raj, Anupama C. Raman, CRC Press.
4. Francis daCosta, “Rethinking the Internet of Things: A Scalable Approach to Connecting Everything”, 1st Edition, Apress Publications, 2013
5. Cuno Pfister, Getting Started with the Internet of Things, O’Reilly Media, 2011, ISBN: 978-1-4493- 9357-1
6. DGCA RPAS Guidance Manual, Revision 3 – 2020
7. Building Your Own Drones: A Beginners' Guide to Drones, UAVs, and ROVs, John Baichtal

### Online Learning Resources:

1. <https://www.arduino.cc/>
2. <https://www.raspberrypi.org/>
3. <https://nptel.ac.in/courses/106105166/5>
4. <https://nptel.ac.in/courses/108108098/4>

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR**  
**B.Tech (CSE)– III-II Sem** **L T P C**  
**3 0 0 3**  
**(20A05604a) SOFTWARE TESTING**  
**(Professional Elective Course-II)**

**Course Objectives:**

- Introduce the fundamentals of various testing methodologies.
- Describe the principles and procedures for designing test cases.
- Teach debugging methods.

**Course Outcomes :**

After completion of the course, students will be able to

- Understand the basic testing procedures.
- Develop reliable software
- Design test cases for testing different programming constructs
- Test the applications by applying different testing methods and automation tools

**UNIT I Introduction**

Lecture 8Hrs

**Introduction:** Purpose of Testing, Dichotomies, Model for Testing, Consequences of Bugs, Taxonomy of Bugs.

**Flow graphs and Path testing:** Basics Concepts of Path Testing, Predicates, PathPredicates and Achievable Paths, Path Sensitizing, Path Instrumentation, Application of Path Testing.

**UNIT II Flow Testing**

Lecture 9Hrs

**Transaction Flow Testing:** Transaction Flows, Transaction Flow Testing Techniques.

**Dataflow testing:** Basics of Dataflow Testing, Strategies in Dataflow Testing, Application of Dataflow Testing.

**UNIT III Domain Testing**

Lecture 9Hrs

**Domain Testing:** Domains and Paths, Nice & Ugly Domains, Domain testing, Domains and Interfaces Testing, Domain and Interface Testing, Domains and Testability.

**UNIT IV Logic Based Testing**

Lecture 8Hrs

**Paths, Path products and Regular expressions:** Path Products & Path Expression, Reduction Procedure, Applications, Regular Expressions & Flow Anomaly Detection. **Logic Based Testing:** Overview, Decision Tables, Path Expressions, KV Charts, Specifications.

**UNIT V Graph Matrices and Application**

Lecture 8Hrs

**State, State Graphs and Transition Testing:** State Graphs, Good & Bad StateGraphs, State Testing, Testability Tips.

**Graph Matrices and Application:** Motivational Overview, Matrix of Graph, Relations, Power of a Matrix, Node Reduction Algorithm, Building Tools.

**Textbooks:**

1. Boris Beizer, "Software testing techniques", Dreamtech, second edition, 2002.

**Reference Books:**

1. Brian Marick, "The craft of software testing", Pearson Education.
2. Yogesh Singh, "Software Testing", Camebridge
3. P.C. Jorgensen, "Software Testing" 3rd edition, Aurbach Publications (Dist.by SPD).
4. N.Chauhan, "Software Testing", Oxford University Press.
5. P.Ammann&J.Offutt, "Introduction to Software Testing" , Cambridge Univ. Press.
6. Perry, "Effective methods of Software Testing", John Wiley, 2nd Edition, 1999.

**Online Learning Resources:**

<http://www.nptelvideos.in/2012/11/software-engineering.html>

[https://onlinecourses.nptel.ac.in/noc16\\_cs16/preview](https://onlinecourses.nptel.ac.in/noc16_cs16/preview)

<https://nptel.ac.in/courses/117105135>

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR**  
**B.Tech (CSE)– III-II Sem** **L T P C**  
**3 0 0 3**  
**(20A05604b) ADVANCED COMPUTER ARCHITECTURE**

**(Professional Elective Course-II)**

**Course Objectives:**

- Understand the Concept of Parallel Processing and its applications
- Implement the Hardware for Arithmetic Operations
- Analyse the performance of different scalar Computers
- Develop the Pipelining Concept for a given set of Instructions
- Distinguish the performance of pipelining and non-pipelining environment in a processor

**Course Outcomes:**

After completion of the course, students will be able to

- Illustrate the types of computers, and new trends and developments in computer architecture
- Outline pipelining, instruction set architectures, memory addressing
- Apply ILP using dynamic scheduling, multiple issue, and speculation
- Illustrate the various techniques to enhance a processors ability to exploit Instruction-level parallelism (ILP), and its challenges
- Apply multithreading by using ILP and supporting thread-level parallelism (TLP)

**UNIT I**

Lecture 8Hrs

Computer Abstractions and Technology: Introduction, Eight Great Ideas in Computer Architecture, Below Your Program, Under the Covers, Technologies for Building Processors and Memory, Performance, The Power Wall, The Sea Change: The Switch from Uni-processors to Multiprocessors, Benchmarking the Intel Core i7, Fallacies and Pitfalls.

**UNIT II**

Lecture 9Hrs

Instructions: Language of the Computer: Operations of the Computer Hardware, Operands of the Computer Hardware, Signed and Unsigned Numbers, Representing Instructions in the Computer, Logical Operations, Instructions for Making Decisions, Supporting Procedures in Computer Hardware, Communicating with People, MIPS Addressing for 32-Bit immediates and Addresses, Parallelism and Instructions: Synchronization, Translating and Starting a Program, A C Sort Example to Put It All Together, Arrays versus Pointers, ARMv7 (32-bit) Instructions, x86 Instructions, ARMv8 (64-bit) Instructions.

**UNIT III**

Lecture 9Hrs

Arithmetic for Computers: Introduction, Addition and Subtraction, Multiplication, Division, Floating Point, Parallelism and Computer Arithmetic: Subword Parallelism, Streaming SIMD Extensions and Advanced Vector Extensions in x86, Subword Parallelism and Matrix Multiply.

#### UNIT IV

Lecture 8Hrs

The Processor: Introduction, Logic Design Conventions, Building a Datapath, A Simple Implementation Scheme, An Overview of Pipelining, Pipelined Datapath and Control, Data Hazards: Forwarding versus Stalling, Control Hazards, Exceptions, Parallelism via Instructions, The ARM Cortex-A8 and Intel Core i7 Pipelines.

#### UNIT V

Lecture 8Hrs

Large and Fast: Exploiting Memory Hierarchy: Introduction, Memory Technologies, The Basics of Caches, Measuring and Improving Cache Performance, Dependable Memory Hierarchy, Virtual Machines, Virtual Memory, A Common Framework for Memory Hierarchy, Using a Finite-State Machine to Control a Simple Cache, Parallelism and Memory Hierarchies: Cache Coherence, Parallelism and Memory Hierarchy: Redundant Arrays of Inexpensive Disks, Advanced Material: Implementing Cache Controllers, The ARM Cortex-A8 and Intel Core i7 Memory Hierarchies.

#### Textbooks:

- 1) Computer Organization and Design: The hardware and Software Interface, David A Patterson, John L Hennessy, 5th edition, MK.
- 2) Computer Architecture and Parallel Processing – Kai Hwang, Faye A.Brigs, Mc Graw Hill.

#### Reference Books:

- 1) Modern Processor Design: Fundamentals of Super Scalar Processors, John P. Shen and Miikko H. Lipasti, Mc Graw Hill.
- 2) Advanced Computer Architecture – A Design Space Approach – DezsóSima, Terence Fountain, Peter Kacsuk , Pearson.

#### Online Learning Resources:

<https://nptel.ac.in/courses/106/105/106105163/>

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR**  
**B.Tech (CSE)– III-II Sem**

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(20A05604c) **COMPUTER VISION**  
**Common to CSE, IT,CSD, CSE(AI), CSE(AI&ML)AI&DS**

**(Professional Elective Course– II)**

**Course Objectives:**

The objective of this course is to understand the basic issues in computer vision and major approaches to address the methods to learn the Linear Filters, segmentation by clustering, Edge detection, Texture.

**Course Outcomes:**

After completing the course, you will be able to:

- Identify basic concepts, terminology, theories, models and methods in the field of computer vision,
- Describe known principles of human visual system,
- Describe basic methods of computer vision related to multi-scale representation, edge detection and detection of other primitives, stereo, motion and object recognition,
- Suggest a design of a computer vision system for a specific problem

**UNIT I LINEAR FILTERS Lecture 8Hrs**

Introduction to Computer Vision, Linear Filters and Convolution, Shift Invariant Linear Systems, Spatial Frequency and Fourier Transforms, Sampling and Aliasing Filters as Templates, Technique: Normalized Correlation and Finding Patterns, Technique: Scale and Image Pyramids.

**UNIT II EDGE DETECTION Lecture 9Hrs**

Noise- Additive Stationary Gaussian Noise, Why Finite Differences Respond to Noise, Estimating Derivatives - Derivative of Gaussian Filters, Why Smoothing Helps, Choosing a Smoothing Filter, Why Smooth with a Gaussian? Detecting Edges-Using the Laplacian to Detect Edges, Gradient-Based Edge Detectors, Technique: Orientation Representations and Corners.

**UNIT III TEXTURE Lecture 9Hrs**

Representing Texture –Extracting Image Structure with Filter Banks, Representing Texture using the Statistics of Filter Outputs, Analysis (and Synthesis) Using Oriented Pyramids –The Laplacian Pyramid, Filters in the Spatial Frequency Domain, Oriented Pyramids, Application: Synthesizing Textures for Rendering, Homogeneity, Synthesis by Sampling Local Models, Shape from Texture, Shape from Texture for Planes

**UNIT IV SEGMENTATION BY CLUSTERING Lecture 8Hrs**

What is Segmentation, Human Vision: Grouping and Gestalt, Applications: Shot Boundary Detection and Background Subtraction. Image Segmentation by Clustering Pixels, Segmentation by Graph-Theoretic Clustering. The Hough Transform, Fitting Lines, Fitting Curves

**UNIT V RECOGNIZATION BY RELATIONS BETWEEN TEMPLATES Lecture 8Hrs**

Finding Objects by Voting on Relations between Templates, Relational Reasoning Using Probabilistic Models and Search, Using Classifiers to Prune Search, Hidden Markov Models, Application: HMM and Sign Language Understanding, Finding People with HMM.

**Textbooks:**

David A. Forsyth, Jean Ponce, Computer Vision – A modern Approach, PHI, 2003.

**Reference Books:**

1. Geometric Computing with Clifford Algebras: Theoretical Foundations and Applications in Computer Vision and Robotics, Springer, 1 edition, 2001 by Sommer.
2. Digital Image Processing and Computer Vision, 1/e, by Sonka.
3. Computer Vision and Applications: Concise Edition (With CD) by Jack Academy Press, 2000.

**Online Learning Resources:** <https://nptel.ac.in/courses/106105216> <https://nptel.ac.in/courses/108103174>

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR**  
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**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR**  
**B.Tech (CSE)– III-II Sem** **L T P C**  
**(20A05601P) COMPILER DESIGN LAB**

**Course Objectives:**

- To introduce LEX and YACC tools
- To learn to develop algorithms to generate code for a target machine
- To implement LL and LR parsers

**Course Outcomes:**

After completion of the course, students will be able to

- Design, develop, and implement a compiler for any language
- Use LEX and YACC tools for developing a scanner and a parser
- Design and implement LL and LR parsers
- Design algorithms to perform code optimization in order to improve the performance of a program in terms of space and time complexity

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**List of Experiments:**



1. Design and implement a lexical analyzer for given language using C and the lexical analyzer should ignore redundant spaces, tabs and new lines.
2. Implementation of Lexical Analyzer using Lex Tool
3. Generate YACC specification for a few syntactic categories.
  - a. Program to recognize a valid arithmetic expression that uses operator +, -, \* and /.
  - b. Program to recognize a valid variable which starts with a letter followed by any number of letters or digits.
  - c. Implementation of Calculator using LEX and YACC
  - d. Convert the BNF rules into YACC form and write code to generate abstract syntax tree
4. Write program to find  $\epsilon$  – closure of all states of any given NFA with  $\epsilon$  transition.
5. Write program to convert NFA with  $\epsilon$  transition to NFA without  $\epsilon$  transition.
6. Write program to convert NFA to DFA
7. Write program to minimize any given DFA.
8. Develop an operator precedence parser for a given language.
9. Write program to find Simulate First and Follow of any given grammar.
10. Construct a recursive descent parser for an expression.
11. Construct a Shift Reduce Parser for a given language.
12. Write a program to perform loop unrolling.
13. Write a program to perform constant propagation.
14. Implement Intermediate code generation for simple expressions.

**References:**

1. Compilers: Principles, Techniques and Tools, Second Edition, Alfred V. Aho, Monica S. Lam, Ravi Sethi, Jeffrey D. Ullman, Pearson.
2. Compiler Construction-Principles and Practice, Kenneth C Loudon, Cengage Learning.
3. Modern compiler implementation in C, Andrew W Appel, Revised edition, Cambridge University Press.
4. The Theory and Practice of Compiler writing, J. P. Tremblay and P. G. Sorenson, TMH
5. Writing compilers and interpreters, R. Mak, 3rd edition, Wiley student edition.

**Online Learning Resources/Virtual Labs:**

<http://cse.iitkgp.ac.in/~bivasm/notes/LexAndYaccTutorial.pdf>

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**B.Tech (CSE)– III-II Sem**

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**(20A05602P) MACHINE LEARNING LAB**

**Common to CSE, CSD,CSE(AI),CSE(AI&ML),CSE(DS),AI&DS**

**Course Objectives:**

- Make use of Data sets in implementing the machine learning algorithms
- Implement the machine learning concepts and algorithms in any suitable language of choice.

**Course Outcomes (CO):**

After completion of the course, students will be able to

- Understand the Mathematical and statistical perspectives of machine learning algorithms through python programming
- Appreciate the importance of visualization in the data analytics solution.
- Derive insights using Machine learning algorithms

**List of Experiments:**

**Note:**

- a. The programs can be implemented in either JAVA or Python.
- b. For Problems 1 to 6 and 10, programs are to be developed without using the built-in classes or APIs of Java/Python.
- c. Data sets can be taken from standard repositories (<https://archive.ics.uci.edu/ml/datasets.html>) or constructed by the students.

1. Implement and demonstrate the FIND-S algorithm for finding the most specific hypothesis based on a given set of training data samples. Read the training data from a .CSV file.
2. For a given set of training data examples stored in a .CSV file, implement and demonstrate the Candidate-Elimination algorithm to output a description of the set of all hypotheses consistent with the training examples.
3. Write a program to demonstrate the working of the decision tree based ID3 algorithm. Use an appropriate data set for building the decision tree and apply this knowledge to classify a new sample.
4. Build an Artificial Neural Network by implementing the Back-propagation algorithm and test the same using appropriate data sets.
5. Write a program to implement the naïve Bayesian classifier for a sample training data set stored as a .CSV file. Compute the accuracy of the classifier, considering few test data sets.
6. Assuming a set of documents that need to be classified, use the naïve Bayesian Classifier model to perform this task. Built-in Java classes/API can be used to write the program. Calculate the accuracy, precision, and recall for your data set.
7. Write a program to construct a Bayesian network considering medical data. Use this model to demonstrate the diagnosis of heart patients using standard Heart Disease Data Set. You can use Java/Python ML library classes/API.
8. Apply EM algorithm to cluster a set of data stored in a .CSV file. Use the same data set for clustering using k-Means algorithm. Compare the results of these two algorithms and comment on the quality of clustering. You can add Java/Python ML library classes/API in the program.
9. Write a program to implement k-Nearest Neighbour algorithm to classify the iris data set. Print both correct and wrong predictions. Java/Python ML library classes can be used for this problem.
10. Implement the non-parametric Locally Weighted Regression algorithm in order to fit data points. Select appropriate data set for your experiment and draw graphs.

**Projects**

1. Predicting the Sale price of a house using Linear regression
2. Spam classification using Naïve Bayes algorithm
3. Predict car sale prices using Artificial Neural Networks
4. Predict Stock market trends using LSTM

5. Detecting faces from images

**References:**

1. Python Machine Learning Workbook for beginners, AI Publishing, 2020.

**Online Learning Resources/Virtual Labs:**

- 1) [Machine Learning A-Z \(Python & R in Data Science Course\) | Udemy](#)
- 2) [Machine Learning | Coursera](#)

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**(20A05603P) INTERNET OF THINGS LAB**

**Course Objectives:**

- To introduce components such as WiFi, Bluetooth, Temperature, Moisture sensors
- To know the Micro controller such as Arduino
- To know the System on Chip (SOC) / Single Board Computer such as Raspberry Pi
- To understand HTTP IoT protocols and perform Experiments for data transmission
- To understand UAV/Drones and Internet of Drones Experiments

**Course Outcomes:**

After completion of the course, students will be able to

- Know the various IoT sensors and understand the functionality
- Design and analyze IoT experiments and transfer the data to IoT Clouds
- Design the IoT systems for real time applications
- Understand Drones and Perform Internet of Drones Experiments

**List of Experiments:**

**Experiments using ESP32**

**1. Serial Monitor, LED, Servo Motor - Controlling**

- **Experiment 1:**  
Controlling actuators through Serial Monitor. Creating different led patterns and controlling them using push button switches. Controlling servo motor with the help of joystick.

**2. Distance Measurement of an object**

- **Experiment 2:**  
Calculate the distance to an object with the help of an ultrasonic sensor and display it on an LCD.

**3. LDR Sensor, Alarm and temperature, humidity measurement**

**Experiment 3:**

- Controlling relay state based on ambient light levels using LDR sensor.
- Basic Burglar alarm security system with the help of PIR sensor and buzzer.
- Displaying humidity and temperature values on LCD

**4. Experiments using Raspberry Pi**

**Experiment 4:**

- Controlling relay state based on input from IR sensors
- Interfacing stepper motor with R-Pi
- Advanced burglar alarm security system with the help of PIR sensor, buzzer and keypad.

- (Alarm gets disabled if correct keypad password is entered)
- 5. Automated LED light control based on input from PIR (to detect if people are present) and LDR(ambient light level)

## 5. IOT Framework

### Experiment 5:

Upload humidity & temperature data to ThingSpeak, periodically logging ambient light level to ThingSpeak

### Experiment 6:

Controlling LEDs, relay & buzzer using Blynk app

## 6. HTTP Based

### Experiment 7:

- Introduction to HTTP. Hosting a basic server from the ESP32 to control various digital based actuators (led, buzzer, relay) from a simple web page.

### Experiment 8:

- Displaying various sensor readings on a simple web page hosted on the ESP32.

## 7. MQTT Based

### Experiment 9:

Controlling LEDs/Motors from an Android/Web app, Controlling AC Appliances from an android/web app with the help of relay.

### Experiment 10:

Displaying humidity and temperature data on a web-based application

## 8. UAV/Drone:

### Experiment 11:

- Demonstration of UAV elements, Flight Controller
- Mission Planner flight planning design

### Experiment 12:

- Python program to read GPS coordinates from Flight Controller

## Reference:

1. Adrian McEwen, Hakim Cassimally - Designing the Internet of Things, Wiley Publications, 2012.
2. Alexander Osterwalder, and Yves Pigneur – Business Model Generation – Wiley, 2011
3. ArshdeepBahga, Vijay Madiseti - Internet of Things: A Hands-On Approach, Universities Press, 2014.
4. The Internet of Things, Enabling technologies and use cases – Pethuru Raj, Anupama C.

Raman, CRC Press.

**Online Learning Resources/Virtual Labs:**

<https://www.arduino.cc/>

<https://www.raspberrypi.org/>

## JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

B.Tech (CSE)– III-II Sem

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## (20A52401) SOFT SKILLS

**Course Objectives:**

- To encourage all round development of the students by focusing on soft skills
- To make the students aware of critical thinking and problem-solving skills
- To develop leadership skills and organizational skills through group activities
- To function effectively with heterogeneous teams

**Course Outcomes (CO):**

By the end of the program students should be able to

- Memorize various elements of effective communicative skills
- Interpret people at the emotional level through emotional intelligence
- apply critical thinking skills in problem solving
- analyse the needs of an organization for team building
- Judge the situation and take necessary decisions as a leader
- Develop social and work-life skills as well as personal and emotional well-being

**UNIT – I****Soft Skills & Communication Skills****10 Hrs**

Introduction, meaning, significance of soft skills – definition, significance, types of communication skills - Intrapersonal & Inter-personal skills - Verbal and Non-verbal Communication

**Activities:**

**Intrapersonal Skills-** Narration about self- strengths and weaknesses- clarity of thought – self- expression – articulating with felicity

(The facilitator can guide the participants before the activity citing examples from the lives of the great, anecdotes and literary sources)

**Interpersonal Skills-** Group Discussion – Debate – Team Tasks - Book and film Reviews by groups - Group leader presenting views (non- controversial and secular) on contemporary issues or on a given topic.

**Verbal Communication-** Oral Presentations- Extempore- brief addresses and speeches- convincing- negotiating- agreeing and disagreeing with professional grace.

**Non-verbal communication** – Public speaking – Mock interviews – presentations with an objective to identify non- verbal clues and remedy the lapses on observation

**UNIT – II****Critical Thinking****10 Hrs**

Active Listening – Observation – Curiosity – Introspection – Analytical Thinking – Open-mindedness – Creative Thinking

**Activities:**

Gathering information and statistics on a topic - sequencing – assorting – reasoning – critiquing issues – placing the problem – finding the root cause - seeking viable solution – judging with rationale – evaluating the views of others - Case Study, Story Analysis

**UNIT – III****Problem Solving & Decision Making****10 Hrs**

Meaning & features of Problem Solving – Managing Conflict – Conflict resolution – Methods of decision making – Effective decision making in teams – Methods & Styles

**Activities:**

Placing a problem which involves conflict of interests, choice and views – formulating the problem – exploring solutions by proper reasoning – Discussion on important professional, career and organizational decisions and initiate debate on the appropriateness of the decision.

Case Study & Group Discussion

**UNIT – IV****Emotional Intelligence & Stress Management****10 Hrs**

Managing Emotions – Thinking before Reacting – Empathy for Others – Self-awareness – Self-Regulation – Stress factors – Controlling Stress – Tips

**Activities:**

Providing situations for the participants to express emotions such as happiness, enthusiasm, gratitude, sympathy, and confidence, compassion in the form of written or oral presentations. Providing opportunities for the participants to narrate certain crisis and stress –ridden situations caused by failure, anger, jealousy, resentment and frustration in the form of written and oral presentation, Organizing Debates

**UNIT – V**

**Leadership Skills**

**10 Hrs**

Team-Building – Decision-Making – Accountability – Planning – Public Speaking – Motivation – Risk-Taking - Team Building - Time Management

**Activities:**

Forming group with a consensus among the participants- choosing a leader- encouraging the group members to express views on leadership- democratic attitude- sense of sacrifice – sense of adjustment – vision – accommodating nature- eliciting views on successes and failures of leadership using the past knowledge and experience of the participants, Public Speaking, Activities on Time Management, Motivation, Decision Making, Group discussion etc.

**NOTE:-**

1. The facilitator can guide the participants before the activity citing examples from the lives of the great, anecdotes, epics, scriptures, autobiographies and literary sources which bear true relevance to the prescribed skill.
2. Case studies may be given wherever feasible for example for Decision Making- The decision of King Lear or for good Leadership – Mahendar Singh Dhoni etc.

**Textbooks:**

1. Personality Development and Soft Skills (English, Paperback, Mitra BarunK.)Publisher: Oxford University Press; Pap/Cdr edition (July 22, 2012)
2. Personality Development and Soft Skills: Preparing for Tomorrow, Dr Shikha KapoorPublisher : I K International Publishing House; 0 edition (February 28, 2018)

**Reference Books:**

1. Soft skills: personality development for life success by Prashant Sharma, BPB publications 2018.
2. Soft Skills By Alex K. Published by S.Chand
3. Soft Skills: An Integrated Approach to Maximise Personality Gajendra Singh Chauhan, Sangeetha Sharma Published by Wiley.
4. Communication Skills and Soft Skills (Hardcover, A. Sharma) Publisher: Yking books
5. SOFT SKILLS for a BIG IMPACT (English, Paperback, RenuShorey) Publisher: Notion Press
6. Life Skills Paperback English Dr. Rajiv Kumar Jain, Dr. Usha Jain Publisher: Vayu Education of India

**Online Learning Resources:**

1. [https://youtu.be/DUlsNJtg2L8?list=PLLy\\_2iUCG87CQhELCytvXh0E\\_y-bOO1\\_q](https://youtu.be/DUlsNJtg2L8?list=PLLy_2iUCG87CQhELCytvXh0E_y-bOO1_q)
2. [https://youtu.be/xBaLgJZ0t6A?list=PLzf4HHlsQFwJZel\\_j2PUy0pwjVUgj7KIJ](https://youtu.be/xBaLgJZ0t6A?list=PLzf4HHlsQFwJZel_j2PUy0pwjVUgj7KIJ)
3. <https://youtu.be/-Y-R9hDI7IU>
4. <https://youtu.be/gkLsn4ddmTs>
5. <https://youtu.be/2bf9K2rRWwo>
6. <https://youtu.be/FchfE3c2jzc>



**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR**

**B.Tech (CSE)– III-II Sem**

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**(20A99601) INTELLECTUAL PROPERTY RIGHTS AND PATENTS**

**(Mandatory Non-Credit Course)**

**Course Objectives:**

- This course introduces the student to the basics of Intellectual Property Rights, Copy Right Laws, Cyber Laws, Trade Marks and Issues related to Patents. The overall idea of the course is to help and encourage the student for startups and innovations

**Course Outcomes:**

- Understand IPR law & Cyber law
- Discuss registration process, maintenance and litigations associated with trademarks
- Illustrate the copy right law

Enumerate the trade secret law.

**UNIT I**

Introduction to Intellectual Property Law – Evolutionary past – Intellectual Property Law Basics – Types of Intellectual Property – Innovations and Inventions of Trade related Intellectual Property Rights – Agencies Responsible for Intellectual Property Registration – Infringement – Regulatory – Overuse or Misuse of Intellectual Property Rights – Compliance and Liability Issues.

**UNIT II**

Introduction to Copyrights – Principles of Copyright – Subject Matters of Copyright – Rights Afforded by Copyright Law – Copyright Ownership – Transfer and Duration – Right to Prepare Derivative Works – Rights of Distribution – Rights of performers – Copyright Formalities and Registration – Limitations – Infringement of Copyright – International Copyright Law-Semiconductor Chip Protection Act.

**UNIT III**

Introduction to Patent Law – Rights and Limitations – Rights under Patent Law – Patent Requirements – Ownership and Transfer – Patent Application Process and Granting of Patent – Patent Infringement and Litigation – International Patent Law – Double Patenting – Patent Searching – Patent Cooperation Treaty – New developments in Patent Law- Invention Developers and Promoters.

**UNIT IV**

Introduction to Trade Mark – Trade Mark Registration Process – Post registration procedures – Trade Mark maintenance – Transfer of rights – Inter parties Proceedings – Infringement – Dilution of Ownership of Trade Mark – Likelihood of confusion – Trade Mark claims – Trade Marks Litigation – International Trade Mark Law.

**UNIT V**

Introduction to Trade Secrets – Maintaining Trade Secret – Physical Security – Employee Access Limitation – Employee Confidentiality Agreement – Trade Secret Law – Unfair Competition – Trade Secret Litigation – Breach of Contract – Applying State Law. Introduction to Cyber Law – Information Technology Act – Cyber Crime and E-commerce – Data Security – Confidentiality – Privacy – International aspects of Computer and Online Crime.

**Textbooks:**

1. Deborah E.Bouchoux: “Intellectual Property”. Cengage learning, New Delhi
2. Kompal Bansal & Parishit Bansal “Fundamentals of IPR for Engineers”, BS Publications (Press)
3. Cyber Law. Texts & Cases, South-Western’s Special Topics Collections

**References:**

1. Prabhuddha Ganguli: ‘ Intellectual Property Rights’ Tata Mc-Graw – Hill, New Delhi
2. Richard Stim: “Intellectual Property”, Cengage Learning, New Delhi.
3. R. Radha Krishnan, S. Balasubramanian: “Intellectual Property Rights”, Excel Books. New Delhi.
4. M. Ashok Kumar and Mohd. Iqbal Ali: “Intellectual Property Right” Serials Pub.

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**B.Tech (CSE)– IV-I Sem**

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**(20A05701a) CLOUD COMPUTING**

**Common to CSE,IT, CSD, CSE(AI), CSE(AI&ML), CSE(DS), AI&DS**

**Professional Elective Course - III**

**Course Objectives:**

- To explain the evolving computer model called cloud computing.
- To introduce the various levels of services that can be achieved by cloud.
- To describe the security aspects in cloud.

**Course Outcomes (CO):**

After completion of the course, students will be able to

- Ability to create cloud computing environment
- Ability to design applications for Cloud environment
- Design & develop backup strategies for cloud data based on features.
- Use and Examine different cloud computing services.
- Apply different cloud programming model as per need.

**UNIT I Basics of Cloud computing**

Lecture 8Hrs

**Introduction to cloud computing:** Introduction, Characteristics of cloud computing, Cloud Models, Cloud Services Examples, Cloud Based services and applications

**Cloud concepts and Technologies:** Virtualization, Load balancing, Scalability and Elasticity, Deployment, Replication, Monitoring, Software defined, Network function virtualization, Map Reduce, Identity and Access Management, services level Agreements, Billing.

**Cloud Services and Platforms:** Compute Services, Storage Services, Database Services, Application services, Content delivery services, Analytics Services, Deployment and Management Services, Identity and Access Management services, Open Source Private Cloud software.

**UNIT II Hadoop and Python**

Lecture 9Hrs

**Hadoop MapReduce:** Apache Hadoop, Hadoop Map Reduce Job Execution, Hadoop Schedulers, Hadoop Cluster setup.

**Cloud Application Design:** Reference Architecture for Cloud Applications, Cloud Application Design Methodologies, Data Storage Approaches.

**Python Basics:** Introduction, Installing Python, Python data Types & Data Structures, Control flow, Function, Modules, Packages, File handling, Date/Time Operations, Classes.

**UNIT III Python for Cloud computing**

Lecture 8Hrs

**Python for Cloud:** Python for Amazon web services, Python for Google Cloud Platform, Python for windows Azure, Python for MapReduce, Python packages of Interest, Python web Application Frame work, Designing a RESTful web API.

**Cloud Application Development in Python:** Design Approaches, Image Processing APP, Document Storage App, MapReduce App, Social Media Analytics App.

**UNIT IV Big data, multimedia and Tuning**

Lecture 8Hrs

**Big Data Analytics:** Introduction, Clustering Big Data, Classification of Big data Recommendation of Systems.

**Multimedia Cloud:** Introduction, Case Study: Live video Streaming App, Streaming Protocols, case Study: Video Transcoding App.

**Cloud Application Benchmarking and Tuning:** Introduction, Workload Characteristics, Application Performance Metrics, Design Considerations for a Benchmarking Methodology, Benchmarking Tools, Deployment Prototyping, Load Testing & Bottleneck Detection case Study, Hadoop benchmarking case Study.

**UNIT V Applications and Issues in Cloud**

Lecture 9 Hrs

**Cloud Security:** Introduction, CSA Cloud Security Architecture, Authentication, Authorization, Identity Access Management, Data Security, Key Management, Auditing.

**Cloud for Industry, Healthcare & Education:** Cloud Computing for Healthcare, Cloud computing for Energy Systems, Cloud Computing for Transportation Systems, Cloud Computing for Manufacturing Industry, Cloud computing for Education.

**Migrating into a Cloud:** Introduction, Broad Approaches to migrating into the cloud, the seven-step model of migration into a cloud.

**Organizational readiness and Change Management in The Cloud Age:** Introduction, Basic concepts of Organizational Readiness, Drivers for changes: A frame work to comprehend the competitive environment, common change management models, change management maturity models, Organizational readiness self – assessment.

**Legal Issues in Cloud Computing:** Introduction, Data Privacy and security Issues, cloud contracting models, Jurisdictional issues raised by virtualization and data location, commercial and business considerations, Special Topics.

**Textbooks:**

1. Cloud computing A hands-on Approach|| By ArshdeepBahga, Vijay Madiseti, Universities Press, 2016
2. Cloud Computing Principles and Paradigms: By Raj Kumar Buyya, James Broberg, Andrzej Goscinski, Wiley, 2016

**Reference Books:**

1. Mastering Cloud Computing by Rajkumar Buyya, Christian Vecchiola, SThamaraiSelvi, TMH
2. Cloud computing A Hands-On Approach by ArshdeepBahga and Vijay Madiseti.
3. Cloud Computing: A Practical Approach, Anthony T. Velte, Toby J. Velte, Robert Elsenpeter, Tata McGraw Hill, rp2011.
4. Enterprise Cloud Computing, Gautam Shroff, Cambridge University Press, 2010.
5. Cloud Application Architectures: Building Applications and Infrastructure in the Cloud, George Reese, O 'Reilly, SPD, rp2011.
6. Essentials of Cloud Computing by K. Chandrasekaran. CRC Press.

**Online Learning Resources:**

[Cloud computing - Course \(nptel.ac.in\)](https://nptel.ac.in)

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**(20A05701b) AGILE METHODOLOGIES**

**(Professional Elective Course– III)**

**Course Objectives:**

- To provide students with a theoretical as well as practical understanding of agile software development practices and how small teams can apply them to create high-quality software.
- To provide good understanding of software design and a set of software technologies and APIs.
- To carry out detailed examination and demonstration of Agile development and testing techniques.
- To discuss Agile software development

**Course Outcomes:**

After completion of the course, students will be able to

- Realize the importance of interacting with business stakeholders in determining the requirements for a software system
- Perform iterative software development processes: how to plan them, how to execute them.
- Point out the impact of social aspects on software development success.
- Develop techniques and tools for improving team collaboration and software quality.
- Perform Software process improvement as an ongoing task for development teams.
- Show how agile approaches can be scaled up to the enterprise level.

**UNIT I AGILE METHODOLOGY**

Lecture 9 Hrs

Theories for Agile Management – Agile Software Development – Traditional Model vs. Agile Model - Classification of Agile Methods – Agile Manifesto and Principles – Agile Project Management – Agile Team Interactions – Ethics in Agile Teams - Agility in Design, Testing – Agile Documentations – Agile Drivers, Capabilities and Values

**UNIT II AGILE PROCESSES**

Lecture 8Hrs

Lean Production - SCRUM, Crystal, Feature Driven Development- Adaptive Software Development - Extreme Programming: Method Overview – Lifecycle – Work Products, Roles and Practices.

**UNIT III AGILITY AND KNOWLEDGE MANAGEMENT**

Lecture 8 Hrs

Agile Information Systems – Agile Decision Making - Earl\_S Schools of KM – Institutional Knowledge Evolution Cycle – Development, Acquisition, Refinement, Distribution, Deployment, Leveraging – KM in Software Engineering – Managing

Software Knowledge – Challenges of Migrating to Agile Methodologies – Agile Knowledge Sharing – Role of Story-Cards – Story-Card Maturity Model (SMM).

**UNIT IV AGILITY AND REQUIREMENTS ENGINEERING**

Lecture 9 Hrs

Impact of Agile Processes in RE–Current Agile Practices – Variance – Overview of RE Using Agile – Managing Unstable Requirements – Requirements Elicitation – Agile Requirements Abstraction Model – Requirements Management in Agile Environment, Agile Requirements Prioritization – Agile Requirements Modeling and Generation – Concurrency in Agile Requirements Generation.

**UNIT V AGILITY AND QUALITY ASSURANCE**

Lecture 9 Hrs

Agile Product Development – Agile Metrics – Feature Driven Development (FDD) – Financial and Production Metrics in FDD – Agile Approach to Quality Assurance – Test Driven Development – Agile Approach in Global Software Development.

**Textbooks:**

1. David J. Anderson and Eli Schragenheim, —Agile Management for Software Engineering: Applying the Theory of Constraints for Business Results, Prentice Hall, 2003.
2. Hazza and Dubinsky, —Agile Software Engineering, Series: Undergraduate Topics in Computer Science, Springer, 2009.

**Reference Books:**

1. Craig Larman, —Agile and Iterative Development: A Manager's Guide, Addison-Wesley, 2004.
2. Kevin C. Desouza, —Agile Information Systems: Conceptualization, Construction, and Management, Butterworth-Heinemann, 2007.

**Online Learning Resources:**

<https://www.nptelvideos.com/video.php?id=904>

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**(20A05701c) VEHICULAR ADHOC NETWORKS**

**(Professional Elective Course– III)**

**Course Objectives:**

- Introduce to the students with the emerging technologies, standards and applications in vehicular communication systems
- Study the design considerations and challenges of vehicle-to-infrastructure and vehicle-to-vehicle communications
- Theories such as vehicular mobility modeling, and vehicular technologies and standards from the physical to network layers will be introduced
- Examples of emerging applications of vehicular communication in Intelligent Transportation Systems will also be studied and discussed.

**Course Outcomes:**

After completion of the course, students will be able to

- Understand and describe the basic theories and principles, technologies, standards, and system architecture of vehicular ad-hoc networks (VANET) or inter-vehicle communication networks.
- Analyze, design, and evaluate vehicular communication platforms for various kinds of safety and infotainment applications.

**UNIT I Introduction**

Lecture 8 Hrs

Basic Principles and Challenges, Past and ongoing VANET activities, Cooperative Vehicular Safety applications – Enabling technologies, cooperative system architecture, safety applications.

**UNIT II Vehicular Mobility Modelling**

Lecture 9Hrs

Random models, flow and traffic models, behavioural models, trace and survey-based models, joint transport and communication simulations

**UNIT III Vehicular Communications**

Lecture 9Hrs

Physical Layer Consideration- Signal propagation, Doppler spread and its impact on OFDM systems, MAC Layer- Proposed MAC approaches and standards, IEEE 802.11p

**UNIT IV VANET Routing Protocols**

Lecture 9Hrs

Opportunistic packet forwarding, topology based routing, geographic routing

**UNIT V Applications, Standards and Regulations**

Lecture Hrs

VANET limitations, example applications, communication paradigms, message coding and composition, data aggregation, Regulations and Standards, DSRC protocol stack, Cellular V2X.

**Textbooks:**

1. H.Hartenstein and K.P. Laberteaux, VANET: Vehicular Applications and Inter-Networking Technologies, Wiley 2010.

**Reference Books:**

1. P. H.-J. Chong, I. W.-H. Ho, Vehicular Networks: Applications, Performance Analysis and Challenges, Nova Science Publishers, 2019.
2. C. Sommer, F. Dressler, Vehicular Networking, Cambridge University Press, 2015.
3. M. Emmelmann, B. Bochow and C. C. Kellum, Vehicular Networking: Automotive Applications and Beyond, Wiley, 2010.
4. M. Watfa, Advances in Vehicular Ad-Hoc Networks: Development and Challenges, Information Science Reference, 2010.
5. H. Moustafa, Y. Zhang, Vehicular Networks: Techniques, Standards, and Applications, CRC Press, 2009.

**Online Learning Resources:**<https://nptel.ac.in/courses/106105160>

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**(20A05702a) FUNDAMENTALS OF AR/VR**  
**(Professional Elective Course– IV)**

**Course Objectives:**

- To Teach about human interaction with computers
- To Demonstrate Virtual reality
- To introduce to the design of visualization tools
- To explain how to apply VR/MR/AR for various applications.

**Course Outcomes:**

After completion of the course, students will be able to

- Demonstrate human interaction with computers
- Animate using Virtual reality and 3D Art optimization
- Design audio and video interaction paradigms
- Design Data visualization tools
- Apply VR/AR in various fields in industry

**UNIT I**

Lecture 8Hrs

**How Humans interact with Computers:** Common term definition, introduction, modalities through the ages (pre- 20<sup>th</sup> century, through world war-II, post-world war-II, the rise of personal computing, computer miniaturization), why did we just go over all of this? Types of common HCI modalities, new modalities, the current state of modalities for spatial computing devices, current controllers for immersive computing systems, a note on hand tracking and hand pose recognition.

**Designing for our Senses, Not our Devices:** Envisioning a future, sensory technology explained,

who are we building this future for?, sensory design, five sensory principles, Adob's AR story.

## UNIT II

Lecture 9Hrs

**Virtual Reality for Art:** A more natural way of making 3D art, VR for animation.

**3D art optimization:** Introduction, draw calls, using VR tools for creating 3D art, acquiring 3D models vs making them from scratch.

**How the computer vision that makes augmented reality possible works:** Who are we?, a brief history of AR, how and why to select an AR platform, mapping, platforms, other development considerations, the AR cloud.

## UNIT III

Lecture 9Hrs

**Virtual reality and augmented reality:** cross platform theory: Why cross platform? The role of game engines, understanding 3D graphics, portability lessons from video game design, simplifying the controller input.

**Virtual reality toolkit:** open source framework for the community: What is VRTK and why people use it? the history of VRTK, welcome to the steam VR unity toolkit, VRTK v4, the future of VRTK, success of VRTK.

**Three virtual reality and augmented reality development practices:** Developing for virtual reality and augmented reality, handling locomotion, effective use of audio, common interaction paradigms.

## UNIT IV

Lecture 8Hrs

**Data and machine learning visualization design and development in spatial computing:** Introduction, understanding data visualization, principles for data and machine learning visualization design and development in spatial computing, why data and machine learning visualization works in spatial computing, 2D data visualization vs 3D data visualization in spatial computing, interactivity in data visualizations and in spatial computing, animation, failures in data visualization, good data visualization design optimize 3D spaces, data representations, infographics, and interactions, defining distinctions in data visualization and big data for machine, how to create data visualization: data visualization creation pipeline, webXR, data visualization challenges in XR, data visualization industry use case examples of data visualization, 3D reconstruction and direct manipulation of real world data, data visualization is for everyone, hands on tutorials, how to create data visualization, resources.

## UNIT V

Lecture 8Hrs

**Character AI and Behaviors:** Introduction, behaviors, current practice: Reactive AI, more intelligence in the system, Deliberative AI, machine learning.

**The virtual and augmented reality health technology ecosystem:** VR/AR health technology application design, standard UX isn't intuitive, tutorial: insight Parkinson's experiment, companies, case studies from leading academic institutions.

### Textbooks:

1. Erin Pangilinan, Steve lukas, and Vasanth Mohan, "Creating Augmented & Virtual Realities", 1<sup>st</sup> edition, O'REILLY, 2019.



**Reference Books:**

- Steve Aukstakalnis, “Practical Augmented Reality”, Pearson Education, 2017.

**Online Learning Resources:**

<https://nptel.ac.in/courses/106106138>

<https://nptel.ac.in/courses/121106013>

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**(20A05702b) CRYPTOGRAPHY & NETWORK SECURITY**

**(Professional Elective Course – IV)**

**Course Objectives:**

This course aims at training students to master the:

- The concepts of classical encryption techniques and concepts of finite fields and number theory
- Working principles and utilities of various cryptographic algorithms including secret key cryptography, hashes, and message digests, and public key algorithms
- Design issues and working principles of various authentication protocols, PKI standards
- Various secure communication standards including Kerberos, IPsec, TLS and email
- Concepts of cryptographic utilities and authentication mechanisms to design secure applications

**Course Outcomes:**

- After completion of the course, students will be able to
- Identify information security goals, classical encryption techniques and acquire fundamental knowledge on the concepts of finite fields and number theory
- Compare and apply different encryption and decryption techniques to solve problems related to confidentiality and authentication
- Apply the knowledge of cryptographic checksums and evaluate the performance of different message digest algorithms for verifying the integrity of varying message sizes.
- Apply different digital signature algorithms to achieve authentication and create secure applications
- Apply network security basics, analyse different attacks on networks and evaluate the performance of firewalls and security protocols like TLS, IPsec, and PGP
- Apply the knowledge of cryptographic utilities and authentication mechanisms to design secure applications

**UNIT I**

Lecture 9Hrs

Computer and Network Security Concepts: Computer Security Concepts, The OSI Security Architecture, Security Attacks, Security Services, Security Mechanisms ,A Model for Network Security, Classical Encryption Techniques : Symmetric Cipher Model ,Substitution Techniques ,Transposition Techniques ,Steganography, Block Ciphers : Traditional Block Cipher Structure, The Data Encryption Standard, Advanced Encryption Standard :AES Structure, AES Transformation Functions

**UNIT II**

Lecture 9Hrs

Number Theory:

The Euclidean Algorithm, Modular Arithmetic, Fermat's and Euler's Theorems, The Chinese Remainder Theorem, Discrete Logarithms, Finite Fields: Finite Fields of the Form  $GF(p)$ , Finite Fields of the Form  $GF(2^n)$ . Public Key Cryptography: Principles, Public Key Cryptography Algorithms, RSA Algorithm, Diffie Hellman Key Exchange, Elliptic Curve Cryptography.

### UNIT III

Lecture 9Hrs

Cryptographic Hash Functions: Application of Cryptographic Hash Functions, Requirements & Security, Secure Hash Algorithm, Message Authentication Functions, Requirements & Security, HMAC & CMAC. Digital Signatures: NIST Digital Signature Algorithm, Distribution of Public Keys, X.509 Certificates, Public-Key Infrastructure

### UNIT IV

Lecture 9Hrs

User Authentication: Remote User Authentication Principles, Kerberos. Electronic Mail Security: Pretty Good Privacy (PGP) And S/MIME.

IP Security: IP Security Overview, IP Security Policy, Encapsulating Security Payload, Combining Security Associations, Internet Key Exchange.

### UNIT V

Lecture 8Hrs

Transport Level Security: Web Security Requirements, Transport Layer Security (TLS), HTTPS, Secure Shell (SSH)

Firewalls: Firewall Characteristics and Access Policy, Types of Firewalls, Firewall Location and Configurations.

#### Textbooks:

- 1) Cryptography and Network Security- William Stallings, Pearson Education, 7th Edition.
- 2) Cryptography, Network Security and Cyber Laws – Bernard Menezes, Cengage Learning, 2010 edition.

#### Reference Books:

- 1) Cryptography and Network Security- Behrouz A Forouzan, Debdeep Mukhopadhyaya, Mc-GrawHill, 3rd Edition, 2015.

- 2) Network Security Illustrated, Jason Albanese and Wes Sonnenreich, MGH Publishers, 2003.

**Online Learning Resources:**

- 1) <https://nptel.ac.in/courses/106/105/106105031/lecture> t
- 2) <https://nptel.ac.in/courses/106/105/106105162/lecture> by Dr.SouravMukhopadhyay IIT Kharagpur [VideoLecture]
- 3) <https://www.mitel.com/articles/web-communication-cryptography-and-network-securityweb> articles by Mitel PowerConnections

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**(20A05702c) NATURAL LANGUAGE PROCESSING****(Professional Elective Course– IV)****Course Objectives:**

- Explain and apply fundamental algorithms and techniques in the area of natural language processing (NLP)
- Discuss approaches to syntax and semantics in NLP.
- Examine current methods for statistical approaches to machine translation.
- Teach machine learning techniques used in NLP.

**Course Outcomes:**

After completion of the course, students will be able to

- Understand the various NLP Applications and Organization of Natural language, able to learn and implement realistic applications using Python.
- Apply the various Parsing techniques, Bayes Rule, Shannon game, Entropy and Cross Entropy.
- Understand the fundamentals of CFG and parsers and mechanisms in ATN's.
- Apply Semantic Interpretation and Language Modelling.
- Apply the concept of Machine Translation and multilingual Information Retrieval systems and Automatic Summarization.

**UNIT I Introduction to Natural language**

Lecture 8Hrs

The Study of Language, Applications of NLP, Evaluating Language Understanding Systems, Different Levels of Language Analysis, Representations and Understanding, Organization of Natural language Understanding Systems, Linguistic Background: An outline of English Syntax.

**UNIT II Grammars and Parsing**

Lecture 9Hrs

Grammars and Parsing- Top-Down and Bottom-Up Parsers, Transition Network Grammars, Feature Systems and Augmented Grammars, Morphological Analysis and the Lexicon, Parsing with Features, Augmented Transition Networks, Bayes Rule, Shannon game, Entropy and Cross Entropy.

**UNIT III Grammars for Natural Language**

Lecture 8Hrs

Grammars for Natural Language, Movement Phenomenon in Language, Handling questions in Context Free Grammars, Hold Mechanisms in ATNs, Gap Threading, Human Preferences in Parsing, Shift Reduce Parsers, Deterministic Parsers.

**UNIT IV**

Lecture 8Hrs

**Semantic Interpretation**

Semantic & Logical form, Word senses & ambiguity, The basic logical form language, Encoding ambiguity in the logical Form, Verbs & States in logical form, Thematic roles, Speech acts & embedded sentences, Defining semantics structure model theory.

**Language Modelling**

Introduction, n-Gram Models, Language model Evaluation, Parameter Estimation, Language Model Adaption, Types of Language Models, Language-Specific Modelling Problems, Multilingual and Cross lingual Language Modelling.

**UNIT V**

Lecture 9 Hrs

**Machine Translation**

Survey: Introduction, Problems of Machine Translation, Is Machine Translation Possible, Brief History, Possible Approaches, Current Status. Anusaraka or Language Accessor: Background, Cutting the Gordian Knot, The Problem, Structure of Anusaraka System, User Interface, Linguistic Area, Giving up Agreement in Anusarsaka Output, Language Bridges.

**Multilingual Information Retrieval**

Introduction, Document Pre-processing, Monolingual Information Retrieval, CLIR, MLIR, Evaluation in Information Retrieval, Tools, Software and Resources.

### **Multilingual Automatic Summarization**

Introduction, Approaches to Summarization, Evaluation, How to Build a Summarizer, Competitions and Datasets.

#### **Textbooks:**

1. James Allen, Natural Language Understanding, 2nd Edition, 2003, Pearson Education.
2. Multilingual Natural Language Processing Applications: From Theory To Practice-Daniel M.Bikel and ImedZitouni, Pearson Publications.
3. Natural Language Processing, A paninian perspective, AksharBharathi, Vineetchaitanya, Prentice–Hall of India.

#### **Reference Books:**

1. Charniack, Eugene, Statistical Language Learning, MIT Press, 1993.
2. Jurafsky, Dan and Martin, James, Speech and Language Processing, 2nd Edition, Prentice Hall, 2008.
3. Manning, Christopher and Henrich, Schutze, Foundations of Statistical Natural Language Processing, MIT Press, 1999.

#### **Online Learning Resources:**

<https://nptel.ac.in/courses/106/105/106105158/>

<http://www.nptelvideos.in/2012/11/natural-language-processing.html>

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**(20A05703a) FULL STACK DEVELOPMENT**  
**(Professional Elective Course– V)**

**Course Objectives:**

Learn the core concepts of both the frontend and backend programming course, to get familiar with the latest web development technologies.

**Course Outcomes:**

After completion of the course, students will be able to

- Develop a fully functioning website and deploy on a web server.
- Gain Knowledge about the front end and back end tools
- Find and use of code packages based on their documentation to produce working results in a project.
- Create web pages that function using external data.

**UNIT I Web Development Basics**

Lecture 8Hrs

Web development Basics - HTML & Web servers Shell - UNIX CLI Version control –Git&Github HTML, CSS

**UNIT II Frontend Development**

Lecture 9Hrs

Javascript basics OOPS Aspects of JavaScript Memory usage and Functions in JS AJAX for data exchange with server jQuery Framework jQuery events, UI components etc. JSON data format.

**UNIT III REACT JS**

Lecture 9Hrs

Introduction to React Router and Single Page Applications React Forms, Flow Architecture and Introduction to Redux More Redux and Client-Server Communication

**UNIT IV Java Web Development**

Lecture 8Hrs

JAVA PROGRAMMING BASICS, Model View Controller (MVC) Pattern MVC Architecture using Spring RESTful API using Spring Framework Building an application using Maven

**UNIT V Databases & Deployment**

Lecture 8Hrs

Relational schemas and normalization Structured Query Language (SQL) Data persistence using Spring JDBC Agile development principles and deploying application in Cloud

**Textbooks:**

1. Web Design with HTML, CSS, JavaScript and JQuery Set Book by Jon Duckett  
ProfessionalJavaScript for Web Developers Book by Nicholas C. Zakas
2. Learning PHP, MySQL, JavaScript, CSS & HTML5: A Step-by-Step Guide to  
CreatingDynamic Websites by Robin Nixon
3. AZAT MARDAN, FullStackJavaScript:LearnBackbone.js,Node.jsandMongoDB.2015

**Reference Books:**

1. Full-Stack JavaScript Development by Eric Bush.
2. Tomasz Dyl ,KamilPrzeorski , MaciejCzarnecki, Mastering Full Stack React Web Development 2017

**Online Learning Resources:**

<https://ict.iitk.ac.in/product/full-stack-developer-html5-css3-js-bootstrap-php-4/>



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**(20A05703b) BLOCKCHAIN TECHNOLOGY AND APPLICATIONS**

**(Professional Elective Course– V)**

**Course Objectives:**

- Understand how block chain systems (mainly Bitcoin and Ethereum) work and to securely interact with them,
- Design, build, and deploy smart contracts and distributed applications,
- Integrate ideas from block chain technology into their own projects.

**Course Outcomes:**

After completion of the course, students will be able to

- Demonstrate the foundation of the Block chain technology and understand the processes in payment and funding.
- Identify the risks involved in building Block chain applications.
- Review of legal implications using smart contracts.
- Choose the present landscape of Block chain implementations and Understand Crypto currency markets.
- Examine how to profit from trading crypto currencies.

**UNIT I Introduction**

Lecture 8Hrs

Introduction, Scenarios, Challenges Articulated, Block chain, Block chain Characteristics, Opportunities Using Block chain, History of Block chain. Evolution of Block chain: Evolution of Computer Applications, Centralized Applications, Decentralized Applications, Stages in Block chain Evolution, Consortia, Forks, Public Block chain Environments, Type of Players in Block chain Ecosystem, Players in Market.

**UNIT II Block chain Concepts**

Lecture 9Hrs

Block chain Concepts: Introduction, Changing of Blocks, Hashing, Merkle-Tree, Consensus, Mining and Finalizing Blocks, Currency aka tokens, security on block chain, data storage on block chain, wallets, coding on block chain: smart contracts, peer-to-peer network, types of block chain nodes, risk associated with block chain solutions, life cycle of block chain transaction.

**UNIT III Architecting Block chain solutions**

Lecture 9Hrs

Architecting Block chain solutions: Introduction, Obstacles for Use of Block chain, Block chain Relevance Evaluation Framework, Block chain Solutions Reference Architecture, Types of Block chain Applications. Cryptographic Tokens, Typical Solution Architecture for Enterprise Use Cases, Types of Block chain Solutions, Architecture Considerations, Architecture with Block chain Platforms, Approach for Designing Block chain Applications.

**UNIT IV Ethereum Block chain Implementation**

Lecture 8Hrs

Ethereum Block chain Implementation: Introduction, Tuna Fish Tracking Use Case, Ethereum Ecosystem, Ethereum Development, Ethereum Tool Stack, Ethereum Virtual Machine, Smart Contract Programming, Integrated Development Environment, Truffle Framework, Ganache, Unit Testing, Ethereum Accounts, My Ether Wallet, Ethereum Networks/Environments, Infura, Etherscan, Ethereum Clients, Decentralized Application, Metamask, Tuna Fish Use Case Implementation, Open Zeppelin Contracts

**UNIT V Hyper ledger Block chain Implementation**

Lecture 8Hrs

Hyperledger Blockchain Implementation, Introduction, Use Case – Car Ownership Tracking, Hyperledger Fabric, Hyperledger Fabric Transaction Flow, FabCar Use Case Implementation, Invoking Chaincode Functions Using Client Application.

Advanced Concepts in Blockchain: Introduction, Inter Planetary File System (IPFS), Zero-Knowledge Proofs, Oracles, Self-Sovereign Identity, Blockchain with IoT and AI/ML Quantum Computing and Blockchain, Initial Coin Offering, Blockchain Cloud Offerings, Blockchain and its Future Potential.

**Textbooks:**

1. Ambadas, Arshad SarfarzAriff, Sham “Blockchain for Enterprise Application Developers”, Wiley
2. Andreas M. Antonopoulos, “Mastering Bitcoin: Programming the Open Blockchain”, O’Reilly

**Reference Books:**

1. Blockchain: A Practical Guide to Developing Business, Law, and Technology Solutions, Joseph Bambara, Paul R. Allen, Mc Graw Hill.
2. Blockchain: Blueprint for a New Economy, Melanie Swan, O’Reilly

**Online Learning Resources:**

1. <https://github.com/blockchainedindia/resources>
2. Hyperledger Fabric - <https://www.hyperledger.org/projects/fabric>
3. Zero to Blockchain - An IBM Redbooks course, by Bob Dill, David Smits  
<https://www.redbooks.ibm.com/Redbooks.nsf/RedbookAbstracts/crse0401.htm>
4. <https://nptel.ac.in/courses/106105184>
5. [https://onlinecourses.nptel.ac.in/noc22\\_cs44/preview](https://onlinecourses.nptel.ac.in/noc22_cs44/preview)

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**(20A05703c) DEEP LEARNING**

**(Professional Elective Course– V)**

**Course Objectives:**

- Demonstrate the major technology trends driving Deep Learning
- Build, train, and apply fully connected deep neural networks
- Implement efficient (vectorized) neural networks
- Analyse the key parameters and hyper parameters in a neural network's architecture

**Course Outcomes:**

After completion of the course, students will be able to

- Demonstrate the mathematical foundation of neural network
- Describe the machine learning basics
- Differentiate architecture of deep neural network
- Build a convolutional neural network
- Build and train RNN and LSTMs

**UNIT I**

Lecture 8Hrs

Linear Algebra: Scalars, Vectors, Matrices and Tensors, Matrix operations, types of matrices, Norms, Eigen decomposition, Singular Value Decomposition, Principal Components Analysis.  
Probability and Information Theory: Random Variables, Probability Distributions, Marginal Probability, Conditional Probability, Expectation, Variance and Covariance, Bayes' Rule, Information Theory. Numerical Computation: Overflow and Underflow, Gradient-Based Optimization, Constrained Optimization, Linear Least Squares.

**UNIT II**

Lecture 9Hrs

Machine Learning: Basics and Underfitting, Hyper parameters and Validation Sets, Estimators, Bias and Variance, Maximum Likelihood, Bayesian Statistics, Supervised and Unsupervised Learning, Stochastic Gradient Descent, Challenges Motivating Deep Learning. Deep Feedforward Networks: Learning XOR, Gradient-Based Learning, Hidden Units, Architecture Design, Back-Propagation and other Differentiation Algorithms.

**UNIT III**

Lecture 8Hrs

Regularization for Deep Learning: Parameter Norm Penalties, Norm Penalties as Constrained Optimization, Regularization and Under-Constrained Problems, Dataset Augmentation, Noise Robustness, Semi-Supervised Learning, Multi-Task Learning, Early Stopping, Parameter Tying and Parameter Sharing, Sparse Representations, Bagging and Other Ensemble Methods, Dropout, Adversarial Training, Tangent Distance, Tangent Prop and Manifold Tangent Classifier. Optimization

for Training Deep Models: Pure Optimization, Challenges in Neural Network Optimization, Basic Algorithms, Parameter Initialization Strategies, Algorithms with Adaptive Learning Rates, Approximate Second-Order Methods, Optimization Strategies and Meta-Algorithms.

#### UNIT IV

Lecture 9Hrs

Convolutional Networks: The Convolution Operation, Pooling, Convolution, Basic Convolution Functions, Structured Outputs, Data Types, Efficient Convolution Algorithms, Random or Unsupervised Features, Basis for Convolutional Networks.

Lecture 8Hrs

#### UNIT V

Sequence Modeling: Recurrent and Recursive Nets: Unfolding Computational Graphs, Recurrent Neural Networks, Bidirectional RNNs, Encoder-Decoder Sequence-to-Sequence Architectures, Deep Recurrent Networks, Recursive Neural Networks, Echo State Networks, LSTM, Gated RNNs, Optimization for Long-Term Dependencies, Auto encoders, Deep Generative Models.

#### Textbooks:

1. Ian Goodfellow, YoshuaBengio, Aaron Courville, “Deep Learning”, MIT Press,2016.
2. Josh Patterson and Adam Gibson, “Deep learning: A practitioner's approach”, O'Reilly Media, First Edition,2017.

#### Reference Books:

1. Fundamentals of Deep Learning, Designing next-generation machine intelligence algorithms, Nikhil Buduma, O'Reilly, Shroff Publishers,2019.
2. Deep learning Cook Book, Practical recipes to get started Quickly, DouweOsinga, O'Reilly, Shroff Publishers,2019.

#### Online Learning Resources:

- 1.<https://keras.io/datasets/>
- 2.<http://deeplearning.net/tutorial/deeplearning.pdf>
- 3.<https://arxiv.org/pdf/1404.7828v4.pdf>
- 4.<https://www.cse.iitm.ac.in/~miteshk/CS7015.html>
- 5.<https://www.deeplearningbook.org>
- 6.<https://nptel.ac.in/courses/106105215>

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**(20A52701a) ENTREPRENEURSHIP & INCUBATION**  
**(HUMANITIES ELECTIVE II)**

**Course Objectives:**

- To make the student understand about Entrepreneurship
- To enable the student in knowing various sources of generating new ideas in setting up of New enterprise
- To facilitate the student in knowing various sources of finance in starting up of a business
- To impart knowledge about various government sources which provide financial assistance to entrepreneurs/ women entrepreneurs
- To encourage the student in creating and designing business plans

**Course Outcomes:**

- Understand the concept of Entrepreneurship and challenges in the world of competition.
- Apply the Knowledge in generating ideas for New Ventures.
- Analyze various sources of finance and subsidies to entrepreneur/women Entrepreneurs.
- Evaluate the role of central government and state government in promoting Entrepreneurship.
- Create and design business plan structure through incubations.

**UNIT I**

Entrepreneurship - Concept, knowledge and skills requirement - Characteristics of successful entrepreneurs - Entrepreneurship process - Factors impacting emergence of entrepreneurship - Differences between Entrepreneur and Intrapreneur - Understanding individual entrepreneurial mindset and personality - Recent trends in Entrepreneurship.

**UNIT II**

Starting the New Venture - Generating business idea – Sources of new ideas & methods of generating ideas - Opportunity recognition - Feasibility study - Market feasibility, technical/operational feasibility - Financial feasibility - Drawing business plan - Preparing project report - Presenting business plan to investors.

**UNIT III**

Sources of finance - Various sources of Finance available - Long term sources - Short term sources - Institutional Finance – Commercial Banks, SFC's in India - NBFC's in India - their way of financing in India for small and medium business - Entrepreneurship development programs in India - The entrepreneurial journey- Institutions in aid of entrepreneurship development

**UNIT IV**

Women Entrepreneurship - Entrepreneurship Development and Government - Role of Central Government and State Government in promoting women Entrepreneurship - Introduction to various incentives, subsidies and grants – Export- oriented Units - Fiscal and Tax concessions available - Women entrepreneurship - Role and importance - Growth of women entrepreneurship in India - Issues & Challenges - Entrepreneurial motivations.

**UNIT V**

Fundamentals of Business Incubation - Principles and good practices of business incubation- Process of business incubation and the business incubator and how they operate and influence the Type/benefits of incubators - Corporate/educational / institutional incubators - Broader business incubation environment - Pre-Incubation and Post - Incubation process - Idea lab, Business plan structure - Value proposition

**Textbooks:**

1. D F Kuratko and T V Rao, “Entrepreneurship” - A South-Asian Perspective – Cengage Learning, 2012. (For PPT, Case Solutions Faculty may visit : [login.cengage.com](http://login.cengage.com))
2. Nandan H, “Fundamentals of Entrepreneurship”, PHI, 2013

**References:**

1. Vasant Desai, “Small Scale Industries and Entrepreneurship”, Himalaya Publishing 2012.

2. Rajeev Roy “Entrepreneurship”, 2<sup>nd</sup> Edition, Oxford, 2012.
3. B.JanakiramandM.Rizwanal “Entrepreneurship Development: Text & Cases”, Excel Books, 2011.
4. Stuart Read, Effectual “Entrepreneurship”, Routledge, 2013.

**E-Resources**

1. Entrepreneurship-Through-the-Lens-of-enture Capital
2. <http://www.onlinevideolecture.com/?course=mba-programs&subject=entrepreneurship>
3. [http://nptel.ac.in/courses/122106032/Pdf/7\\_4.pdf](http://nptel.ac.in/courses/122106032/Pdf/7_4.pdf)
4. <http://freevideolectures.com/Course/3514/Economics-/-Management-/-Entrepreneurhip/50>

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR**

**B.Tech (CSE)– IV-I Sem**

**L T P C**

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**(20A52701b) MANAGEMENT SCIENCE  
(HUMANITIES ELECTIVE-II)**

**Course Objectives:**

- To provide fundamental knowledge on Management, Administration, Organization & its concepts.
- To make the students understand the role of management in Production
- To impart the concept of HRM in order to have an idea on Recruitment, Selection, Training & Development, job evaluation and Merit rating concepts
- To create awareness on identify Strategic Management areas & the PERT/CPM for better Project Management
- To make the students aware of the contemporary issues in management

**Course Outcomes:**

- Understand the concepts & principles of management and designs of organization in a practical world
- Apply the knowledge of Work-study principles & Quality Control techniques in industry
- Analyze the concepts of HRM in Recruitment, Selection and Training & Development.
- Evaluate PERT/CPM Techniques for projects of an enterprise and estimate time & cost of project & to analyze the business through SWOT.
- Create Modern technology in management science.

**UNIT I INTRODUCTION TO MANAGEMENT**

Management - Concept and meaning - Nature-Functions - Management as a Science and Art and both. Schools of Management Thought - Taylor's Scientific Theory-Henry Fayol's principles - Eltan Mayo's Human relations - Systems Theory - **Organisational Designs** - Line organization - Line & Staff Organization - Functional Organization - Matrix Organization - Project Organization - Committee form of Organization - Social responsibilities of Management.

**UNIT II OPERATIONS MANAGEMENT**

Principles and Types of Plant Layout - Methods of Production (Job, batch and Mass Production), Work Study - Statistical Quality Control- Deming's contribution to Quality. **Material Management** - Objectives - Inventory-Functions - Types, Inventory Techniques - EOQ-ABC Analysis - Purchase Procedure and Stores Management - **Marketing Management** - Concept - Meaning - Nature-Functions of Marketing - Marketing Mix - Channels of Distribution - Advertisement and Sales Promotion - Marketing Strategies based on Product Life Cycle.

**UNIT III HUMAN RESOURCES MANAGEMENT (HRM)**

HRM - Definition and Meaning – Nature - Managerial and Operative functions - Evolution of HRM - Job Analysis - Human Resource Planning(HRP) - Employee Recruitment-Sources of Recruitment - Employee Selection - Process and Tests in Employee Selection - Employee Training and Development - On-the- job & Off-the-job training methods - Performance Appraisal Concept - Methods of Performance Appraisal – Placement - Employee Induction - Wage and Salary Administration

**UNIT IV STRATEGIC & PROJECT MANAGEMENT**

Definition & Meaning - Setting of Vision - Mission - Goals - Corporate Planning Process - Environmental Scanning - Steps in Strategy Formulation and Implementation - SWOT Analysis - **Project Management** - 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 ISSUES IN MANAGEMENT**

The concept of Management Information System(MIS) - Materials Requirement Planning (MRP) - Customer Relations Management(CRM) - Total Quality Management (TQM) - Six Sigma Concept - Supply Chain Management(SCM) - Enterprise Resource Planning (ERP) - Performance Management - Business Process Outsourcing (BPO) - Business Process Re-engineering and Bench Marking - Balanced Score Card - Knowledge Management.

**Textbooks:**

1. A.R Aryasri, "Management Science", TMH, 2013
2. Stoner, Freeman, Gilbert, Management, Pearson Education, New Delhi, 2012.

**References:**

1. Koontz & Wehrich, "Essentials of Management", 6<sup>th</sup> edition, TMH, 2005.
2. Thomas N. Duening & John M. Ivancevich, "Management Principles and Guidelines", Biztantra.
3. Kanishka Bedi, "Production and Operations Management", Oxford University Press, 2004.
4. Samuel C. Certo, "Modern Management", 9<sup>th</sup> edition, PHI, 2005



**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR**

**B.Tech (CSE)– IV-I Sem**

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**(20A52701c) ENTERPRISE RESOURCE PLANNING  
(HUMANITIES ELECTIVE-II)**

**Course Objectives:**

- To provide a contemporary and forward-looking on the theory and practice of Enterprise Resource Planning
- To enable the students in knowing the Advantages of ERP
- To train the students to develop the basic understanding of how ERP enriches the Business organizations in achieving a multidimensional growth.
- Impart knowledge about the historical background of BPR
- To aim at preparing the students, technologically competitive and make them ready to self-upgrade with the higher technical skills.

**Course Outcomes:**

- Understand the basic use of ERP Package and its role in integrating business functions.
- Explain the challenges of ERP system in the organization
- Apply the knowledge in implementing ERP system for business
- Evaluate the role of IT in taking decisions with MIS
- Create reengineered business processes with process redesign

**UNIT I**

Introduction to ERP: Enterprise – An Overview Integrated Management Information, Business Modeling, Integrated Data Model Business Processing Reengineering(BPR), Data Warehousing, Data Mining, On-line Analytical Processing(OLAP), Supply Chain Management (SCM), Customer Relationship Management(CRM),

**UNIT II**

Benefits of ERP: Reduction of Lead-Time, On-time Shipment, Reduction in Cycle Time, Improved Resource Utilization, Better Customer Satisfaction, Improved Supplier Performance, Increased Flexibility, Reduced Quality Costs, Improved Information Accuracy and Design-making Capability

**UNIT III**

ERP Implementation Lifecycle: Pre-evaluation Screening, Package Evaluation, Project Planning Phase, Gap Analysis, Reengineering, Configuration, Implementation Team Training, Testing, Going Live, End-user Training, Post-implementation (Maintenance mode)

**UNIT IV**

BPR: Historical background: Nature, significance and rationale of business process reengineering (BPR), Fundamentals of BPR. Major issues in process redesign: Business vision and process objectives, Processes to be redesigned, Measuring existing processes,

**UNIT V**

IT in ERP: Role of information technology (IT) and identifying IT levers. Designing and building a prototype of the new process: BPR phases, Relationship between BPR phases. MIS - Management Information System, DSS - Decision Support System, EIS - Executive Information System.

**Textbooks:**

1. Pankaj Sharma. “Enterprise Resource Planning”. Aph Publishing Corporation, New Delhi, 2004.
2. Alexis Leon, “Enterprise Resource Planning”, IV Edition, Mc.Graw Hill, 2019

**References:**

1. Marianne Bradford “Modern ERP”, 3rd edition.
2. “ERP making it happen Thomas f. Wallace and Michael
3. Directing the ERP Implementation Michael w pelphrey

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**B.Tech (CSE)– IV-I Sem** **L T P C**  
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**(20A05706) MOBILE APPLICATION DEVELOPMENT**  
**(Skill Oriented course - IV)**

**Course Objectives:**

- Learn the configuration of Android Studio, SDK Manager, and AVD Emulators
- Understand Android UI Components and make use of Material Design for Android
- Learn the usage of Libraries, APIs and handle messages
- Explore various Hybrid App Development Platforms
- Acquire the knowledge of app releases and publishing and app to the play store

**Course Outcomes:**

After completion of the course, students will be able to

- Demonstrate the configuration of Android Software Development tools
- Design and develop Mobile Applications using Android and Kotlin
- Develop a complex android application by using apis, Libraries, and message handling techniques
- Construct the mobile application using a hybrid framework or SDK
- Release and publish an application on Google Play Store

**Activities:**

**Module 1:**

Android OS Architecture: Application Layer, Framework Layer, Libraries and Runtime, Hardware Abstraction Layer, and Kernel

Task: Select any two Mobile Apps used in your mobile phone and note the various functionalities and their corresponding layers

**Module 2:**

Android Studio: Install Android Studio, SDK Manager, Configure Plugins, Android Virtual Device(AVD) Emulators

Task: Install Android Studio and Configure Latest Android SDKs and Android Virtual Devices

**Module 3:**

Building your First Application: Understanding Activities and Intents, Activity Lifecycle and Managing State, Activities and Implicit Intents

Task: Build and Run Hello World Application on the virtual Device and also test the app on your mobile phone

**Module 4:**

Android UI components: Text Controls, Buttons, Widgets, Layouts, Containers

Task: Explore all the UI Controls and design a Student Registration Activity

**Module 5:**

Material Design for Android: Material theme and widgets, Elevation shadows, Cards, Animations, Drawables

Task: Design the Student Registration Activity using Material Design for Android Components

**Module 6:**

Navigation: Back-button navigation, Hierarchical navigation patterns, Ancestral navigation (Up button), Descendant navigation, Lateral navigation with tabs and swipes

Task: Design a complete Student Management Application using Android and provide effective navigation between various Activities

**Module 7:**

Connect to the Internet: Security best practices for network operations, Including permissions in the manifest, Performing network operations on a worker thread, Making an HTTP connection, Parsing the results, Managing the network state

Task: Develop an Android Application that stores Student Details into the hosting server and retrieve student details from the server

**Module 8:**

Messages and Storage: Creating a Snackbar object, Showing the message to the user, instantiate a Toast object, Show the toast, Add Notification to your App, Customize Notifications, App-specific storage, Preferences, Room persistence library

Task: Secure the Student Management Application with proper hints, messages, notifications, and logging

**Module 9:**

GeoLocation: Set up the project and get an API Key, Add Markers on the map, map Styles, Enable location tracking

Task: Add your college location on maps and also provide a location tracking feature in your app

**Module 10:**

Authentication: Add Firebase to the project, Email Authentication, Phone Authentication, Gmail Authentication

Task: Design and implement an effective student Login System with OTP feature and email

authentication using firebase

**Module 11:**

Hybrid App Development: Hybrid App vs Native App, React-Native, Flutter, Ionic, Xamarin

Task: Design Student Management App using any one of the Hybrid Frameworks or SDKs.

**Module 12:**

Publish App to Play Store: Add a launcher icon and Application ID, Specify API Level targets and version number, Disable logging and debugging, Generate signed APK for release, Create a Google Developer Account, Run pre-launch reports, Review criteria for publishing, Submit your app for publishing.

Task: Prepare and Publish Your Android Apps in Google Play Store

**References:**

1. Smyth, Neil. Android Studio 4.2 Development Essentials - Kotlin Edition: Developing Android Apps Using Android Studio 4.2, Kotlin, and Android Jetpack, Payload Media, Incorporated, 2021.
2. Cheng, Fu. Build Mobile Apps with Ionic 4 and Firebase: Hybrid Mobile App Development. Germany, Apress, 2018.
3. Derks, Roy, and Boduch, Adam. React and React Native: A Complete Hands-on Guide to Modern Web and Mobile Development with React.js, 3rd Edition. United Kingdom, Packt Publishing, 2020.

**Online Learning Resources/Virtual Labs:**

<https://developer.android.com/>

<https://material.io/>

<https://kotlinlang.org/>

<https://google-developer-training.github.io/android-developer-fundamentals-course-concepts/>

<https://developers.google.com/>

# OPEN ELECTIVES

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR**  
**B.Tech III-I Sem** **L T P C**  
**3 0 0 3**  
**(20A01505) BUILDING TECHNOLOGY**

**(Open Elective-I)**

**Course Objectives:**

- To know different types of buildings, principles and planning of the buildings.
- To identify the termite control measure in buildings, and importance of grouping circulation, lighting and ventilation aspects in buildings.
- To know the different modes of vertical transportation in buildings.
- To know the utilization of prefabricated structural elements in buildings.
- To know the importance of acoustics in planning and designing of buildings.

**Course Outcomes (CO):**

- Understand the principles in planning and design the buildings
- To get different types of buildings, principles and planning of the buildings
- To know the different methods of termite proofing in buildings.
- Know the different methods of vertical transportation in buildings.
- Know the implementation of prefabricated units in buildings and effect of earthquake on buildings.
- Know the importance of acoustics in planning and designing of buildings.

**UNIT I**

Overview of the course, basic definitions, buildings-types-components-economy and design-principles of planning of buildings and their importance. Definitions and importance of grouping and circulation-lighting and ventilation-consideration of the above aspects during planning of building.

**UNIT II**

Termite proofing: Inspection-control measures and precautions-lighting protection of buildings-general principles of design of openings-various types of fire protection measures to be considered while planning a building.

**UNIT III**

Vertical transportation in a building: Types of vertical transportation-stairs-different forms of stairs-planning of stairs-other modes of vertical transportation –lifts-ramps-escalators.

**UNIT IV**

Prefabrication systems in residential buildings-walls-openings-cupboards-shelves etc., planning and modules and sizes of components in prefabrication. Planning and designing of residential buildings against the earthquake forces, principles, seismic forces and their effect on buildings.

**UNIT V**

Acoustics –effect of noise –properties of noise and its measurements, principles of acoustics of building. Sound insulation-importance and measures.

**Textbooks:**

1. Building construction by Varghese, PHI Learning Private Limited 2<sup>nd</sup> Edition 2015
2. Building construction by Punmia.B.C, Jain.A.K and Jain.A.K Laxmi Publications 11<sup>th</sup> edition 2016

**Reference Books:**

1. National Building Code of India, Bureau of Indian Standards
2. Building construction-Technical teachers training institute, Madras, Tata McGraw Hill.
3. Building construction by S.P.Arora and S.P.BrndraDhanpat Rai and Sons Publications, New Delh 2014 edition

<https://nptel.ac.in/courses/105102206>

<https://nptel.ac.in/courses/105103206>

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR**

**B.Tech III-I Sem**

**L T P C**  
**3 0 0 3**

**(20A02505) ELECTRIC VEHICLES**

**(Open Elective-I)**

**Course Objectives:**

- 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

**Course Outcomes:**

- Understand and differentiate between conventional and latest trends in Electric Vehicles
- Analyze various EV resources, EV dynamics and Battery charging
- Apply basic concepts of EV to design complete EV system
- Design EV system with various fundamental concepts

**UNIT I INTRODUCTION TO EV SYSTEMS AND PARAMETERS**

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.

**UNIT II EV AND ENERGY SOURCES**

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

**UNIT III EV PROPULSION AND DYNAMICS**

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.

**UNIT IV FUEL CELLS**

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

**UNIT V BATTERY CHARGING AND CONTROL**

**Battery charging:** Basic requirements, charger architecture, charger functions, wireless charging, power factor correction.

**Control:** Introduction, modelling of electromechanical system, feedback controller design approach, PI controllers designing, torque-loop, speed control loop compensation, acceleration of battery electric vehicle



**Textbooks:**

1. C.C Chan, K.T Chau: Modern Electric Vehicle Technology, Oxford University Press Inc., 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.

**Online Learning Resources:**

1. [https://onlinecourses.nptel.ac.in/noc22\\_ee53/preview](https://onlinecourses.nptel.ac.in/noc22_ee53/preview)

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR**

**B.Tech III-I Sem**

**L T P C**  
**3 0 0 3**

**(20A03505a) 3D PRINTING TECHNOLOGY**  
**(Open Elective-I)**

**Course Objectives:**

- 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.

**Course Outcomes:**

- Use techniques for processing of CAD models for rapid prototyping.
- Understand and apply fundamentals of rapid prototyping techniques.
- Use appropriate tooling for rapid prototyping process.
- Use rapid prototyping techniques for reverse engineering.
- Identify Various Pre – Processing, Processing and Post Processing errors in RP processes.

**UNIT I Introduction to 3D Printing**

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.

**UNIT II Solid and Liquid Based RP Systems**

Working Principle, Materials, Advantages, Limitations and Applications of Fusion Deposition Modelling (FDM), Laminated Object Manufacturing (LOM), Stereo lithography (SLA), Direct Light Projection System (DLP) and Solid Ground Curing (SGC).

**UNIT III Powder Based & Other RP Systems**

**Powder Based RP Systems:** Working Principle, Materials, Advantages, Limitations and Applications of Selective Laser Sintering (SLS), Direct Metal Laser Sintering (DMLS), Laser Engineered Net Shaping (LENS) and Electron Beam Melting (EBM).

**Other RP Systems:** Working Principle, Materials, Advantages, Limitations and Applications of Three Dimensional Printing (3DP), Ballistic Particle Manufacturing (BPM) and Shape Deposition Manufacturing (SDM).

**UNIT IV Rapid Tooling & Reverse Engineering**

**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.

**UNIT V Errors in 3D Printing and Applications:**

Pre-processing, processing and post-processing errors, Part building errors in SLA, SLS, etc.

**Software:** Need for software, MIMICS, Magics, SurgiGuide, 3-matic, 3D-Doctor, Simplant, Velocity2, VoXim, Solid View, 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.

**Applications:** Design, Engineering Analysis and planning applications, Rapid Tooling, Reverse Engineering, Medical Applications of RP.

**Textbooks:**

1. Chee Kai Chua and Kah Fai Leong, “3D Printing and Additive Manufacturing Principles and Applications” 5/e, World Scientific Publications, 2017.
2. Ian Gibson, David W Rosen, Brent Stucker, “Additive Manufacturing Technologies: 3D Printing, Rapid Prototyping, and Direct Digital Manufacturing”, Springer, 2/e, 2010.

**Reference Books:**

1. Frank W.Liou, "Rapid Prototyping & Engineering Applications", CRC Press, Taylor & Francis Group, 2011.
2. Rafiq Noorani, "Rapid Prototyping: Principles and Applications in Manufacturing", John Wiley&Sons, 2006.

**Online Learning Resources:**

- NPTEL Course on Rapid Manufacturing.
- <https://nptel.ac.in/courses/112/104/112104265/>
- <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.cet.edu.in/noticefiles/258_Lecture%20Notes%20on%20RP-ilovepdf-compressed.pdf)
- [https://www.vssut.ac.in/lecture\\_notes/lecture1517967201.pdf](https://www.vssut.ac.in/lecture_notes/lecture1517967201.pdf)
- <https://www.youtube.com/watch?v=NkC8TNts4B4>

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**B.Tech III-I Sem**

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**3 0 0 3**

**20A27505) COMPUTER APPLICATIONS IN FOOD TECHNOLOGY**

**(Open Elective-1)**

**Course Objectives:**

- To know different software and applications in food technology.
- To understand the Chemical kinetics in food processing, Microbial distraction in thermal processing of food.
- To acquire knowledge on computer aided manufacturing and control of food machinery, inventory control, process control.

**Course Outcomes:**

- Students will gain knowledge on software in food technology, data analysis, Chemical kinetics, microbial distortion in thermal process
- Use of linear regression in analyzing sensory data, application of computer in some common food industries like, milk plant, bakery units & fruits vegetable plants.

**UNIT I**

Introduction to various software and their applications in food technology. Application of MS Excel to solve the problems of Food Technology, SPSS and JMP for data analysis, Pro-Engineering for design, Lab VIEW and SCADA for process control .

**UNIT II**

Chemical kinetics in food processing: Determining rate constant of zero order reaction First order rate constant and half-life of reactions. Determining energy of activation of vitamin degradation during food storage Rates of Enzymes catalyzed reaction. Microbial distraction in thermal processing of food. Determining decimal reduction time from microbial survival data, Thermal resistance factor, Z-values in thermal processing of food. Sampling to ensure that a lot is not contaminated with more than a given percentage Statistical quality control. Probability of occurrence in normal distribution. Using binomial distribution to determine probability of occurrence. Probability of defective items in a sample obtained from large lot

**UNIT III**

Sensory evaluation of food Statistical descriptors of a population estimated from sensory data obtained from a sample Analysis of variance. One factor, completely randomized design For two factor design without replication. Use of linear regression in analyzing sensory data. Mechanical transport of liquid food. Measuring viscosity of liquid food using a capillary tube viscometer . Solving simultaneous equations in designing multiple effect evaporator while using matrix algebra available in excel.

**UNIT IV**

Familiarization with the application of computer in some common food industries like, milk plant, bakery units & fruits vegetable plants, stating from the receiving of raw material up to the storage & dispatch of finished product.

**UNIT V**

Basic Introduction to computer aided manufacturing. Application of computers, instrumentation and control of food machinery, inventory control, process control etc.

**Recommended books:**

1. Computer Applications in Food Technology: Use of Spreadsheets in Graphical, Statistical and Process Analysis by R. Paul Singh, AP.
2. Manuals of MS Office.

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**(20A54501) OPTIMIZATION TECHNIQUES**

**(Open Elective- I)**

**Course Objectives:**

This course enables the students to classify and formulate real-life problem for modeling as optimization problem, solving and applying for decision making.

**Course Outcomes:** Student will be able to

- formulate a linear programming problem and solve it by various methods.
- give an optimal solution in assignment jobs, give transportation of items from sources to destinations.
- identify strategies in a game for optimal profit.
- implement project planning.

**UNIT I**

Introduction to operational research-Linear programming problems (LPP)-Graphical method-Simplex method-Big M Method-Dual simplex method.

**UNIT II**

Transportation problems- assignment problems-Game theory.

**UNIT III**

CPM and PERT –Network diagram-Events and activities-Project Planning-Reducing critical events and activities-Critical path calculations.

**UNIT IV**

Sequencing Problems-Replacement problems-Capital equipment- Discounting costs- Group replacement.

**UNIT V**

Inventory models-various costs- Deterministic inventory models-Economic lot size-Stochastic inventory models- Single period inventory models with shortage cost.

**Textbooks:**

1. Operations Research , S.D. Sharma.
2. Operations Research, An Introduction, Hamdy A. Taha, Pearson publishers.

3. Operations Research, Nita H Shah, Ravi M Gor, Hardik Soni, PHI publishers

**Reference Books:**

1. Problems on Operations Research, Er. Prem kumargupta, Dr.D.S. Hira, Chand publishers
2. Operations Research, CB Gupta, PK Dwivedi, Sunil kumaryadav

**Online Learning Resources:**

[https://nptel.ac.in/content/storage2/courses/105108127/pdf/Module\\_1/M1L2slides.pdf](https://nptel.ac.in/content/storage2/courses/105108127/pdf/Module_1/M1L2slides.pdf)

<https://slideplayer.com/slide/7790901/>

<https://www.ime.unicamp.br/~andreani/MS515/capitulo12.pdf>

## JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

B.Tech III-I Sem

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## (20A56501) MATERIALS CHARACTERIZATION TECHNIQUES

(Open Elective- I)

**Course Objectives:**

- To provide an exposure to different characterization techniques.
- To enlighten the basic principles and analysis of different spectroscopic techniques.
- To explain the basic principle of Scanning electron microscope along with its limitations and applications.
- To identify the Resolving power and Magnification of Transmission electron microscope and its applications.
- To educate the uses of advanced electric and magnetic instruments for characterization.

**Course Outcomes:** At the end of the course the student will be able

- To explain the structural analysis by X-ray diffraction.
- To understand the morphology of different materials using SEM and TEM.
- To recognize basic principles of various spectroscopic techniques.
- To study the electric and magnetic properties of the materials.
- To make out which technique can be used to analyse a material

**UNIT I**

Structure analysis by Powder X-Ray Diffraction: 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 Williamson-Hall (W-H) Methods, Small angle X-ray scattering (SAXS) (in brief).

**UNIT II**

Microscopy technique -1 –Scanning Electron Microscopy (SEM)

Introduction, Principle, Construction and working principle of Scanning Electron Microscopy, Specimen preparation, Different types of modes used (Secondary Electron and Backscatter Electron), Advantages, limitations and applications of SEM.

**UNIT III**

Microscopy Technique -2 - Transmission Electron Microscopy (TEM): 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, Advantage and Limitations of Transmission Electron Microscopy.

**UNIT IV**

Spectroscopy techniques – 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).

**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.

**Textbooks:**

1. Material Characterization: Introduction to Microscopic and Spectroscopic Methods –Yang Leng – John Wiley & Sons (Asia) Pvt. Ltd. 2008
2. Handbook of Materials Characterization -by Sharma S. K. - Springer

**References:**

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
3. Materials Characterization: Introduction to Microscopic and Spectroscopic Methods-[Yang Leng](#)- John Wiley & Sons4.
4. Characterization of Materials 2<sup>nd</sup> Edition, 3 Volumes-Kaufmann E N -John Wiley (Bp)

## JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

B.Tech III-I Sem

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## (20A51501) CHEMISTRY OF ENERGY MATERIALS

(Open Elective- I)

**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
- 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.

**Course Outcomes:**

- 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

**UNIT I: Electrochemical Systems:** Galvanic cell, standard electrode potential, application of EMF, electrical double layer, dipole moments, polarization, Batteries-Lead-acid and Lithium ion batteries.

**UNIT II: 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 III: 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, hydrogen storage by high pressure methods. Liquifaction method.

**UNIT IV:Solar Energy:** Solar energy introduction and prospects, photo voltaic (PV) technology, concentrated solar power (CSP), Solar Fuels, Solar cells.

**UNIT V:** Photo and Photo electrochemical Conversions: Photochemical cells and applications of photochemical reactions, specificity of photo electrochemical cell, advantage of photoelectron catalytic conversions.

**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 7<sup>th</sup> 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



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**B.Tech IV-I Sem**

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**(20A01605) ENVIRONMENTAL ECONOMICS**

**(Open Elective Course - II)**

**Course Objectives:**

- To impart knowledge on sustainable development and economics of energy
- To teach regarding environmental degradation and economic analysis of degradation
- To inculcate the knowledge of economics of pollution and their management
- To demonstrate the understanding of cost benefit analysis of environmental resources
- To make the students to understand principles of economics of biodiversity

**Course Outcomes :**

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

- The information on sustainable development and economics of energy
- The information regarding environmental degradation and economic analysis of degradation
- The identification of economics of pollution and their management
- The cost benefit analysis of environmental resources
- The principles of economics of biodiversity

**UNIT I**

Sustainable Development: Introduction to sustainable development - Economy-Environment inter-linkages - Meaning of sustainable development - Limits to growth and the environmental Kuznets curve – The sustainability debate - Issues of energy and the economics of energy – Nonrenewable energy, scarcity, optimal resources, backstop technology, property research, externalities, and the conversion of uncertainty.

**UNIT II**

Environmental Degradation: Economic significance and causes of environmental degradation - The concepts of policy failure, externality and market failure - Economic analysis of environmental degradation – Equi –marginal principle.

**UNIT - III**

Economics of Pollution: Economics of Pollution - Economics of optimal pollution, regulation, monitoring and enforcement - Managing pollution using existing markets: Bargaining solutions – Managing pollution through market intervention: Taxes, subsidies and permits.

**UNIT IV**

Cost – Benefit Analysis: Economic value of environmental resources and environmental damage - Concept of Total Economic Value - Alternative approaches to valuation – Cost-benefit analysis and discounting.

**UNIT V**

Economics of biodiversity: Economics of biodiversity conservation - Valuing individual species and diversity of species -Policy responses at national and international levels. Economics of Climate Change – stern Report

**Textbooks:**

1. An Introduction to Environmental Economics by N. Hanley, J. Shogren and B. White Oxford University Press.(2001)
2. Blueprint for a Green Economy by D.W. Pearce, A. Markandya and E.B. Barbier Earthscan, London.(1989)

**Reference Books:**

1. Environmental Economics: An Elementary Introduction by R.K. Turner, D.W. Pearce and I. Bateman Harvester Wheatsheaf, London. (1994),
2. Economics of Natural Resources and the Environment by D.W. Pearce and R.K. Turner Harvester Wheat sheaf, London. (1990),
3. Environmental and Resource Economics: An Introduction by Michael S. Common and Michael Stuart 2<sup>nd</sup>Edition, Harlow: Longman.(1996),
4. Natural Resource and Environmental Economics by Roger Perman, Michael Common, Yue Ma and James Mc Gilvray 3<sup>rd</sup>Edition, Pearson Education.(2003),

**Online Learning Resources:**

<https://nptel.ac.in/courses/109107171>

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**B.Tech III-II Sem**

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**(20A02605) SMART ELECTRIC GRID**  
**(Open Elective Course-II)**

**Course Objectives:**

- Understand recent trends in grids, smart grid architecture and technologies
- Analyze smart substations
- Apply the concepts to design smart transmission systems
- Apply the concepts to design smart distribution systems

**Course Outcomes:**

- Understand trends in Smart grids, needs and roles of Smart substations
- Design and Analyze Smart Transmission systems
- Design and Analyze Smart Distribution systems
- Analyze SCADA and DSCADA systems in practical working environment

**UNIT I INTRODUCTION TO SMART GRID**

Working definitions of Smart Grid and Associated Concepts – Smart Grid Functions – Traditional Power Grid and Smart Grid – New Technologies for Smart Grid – Advantages – Indian Smart Grid – Key Challenges for Smart Grid

**UNIT II SMART GRID TECHNOLOGIES**

Characteristics of Smart grid, Micro grids, Definitions, Drives, benefits, types of Micro grid, building blocks, Renewable energy resources, needs in smart grid, integration impact, integration standards, Load frequency control, reactive power control, case studies and test beds

**UNIT III SMART SUBSTATIONS**

Protection, Monitoring and control devices, sensors, SCADA, Master stations, Remote terminal unit, interoperability and IEC 61850, Process level, Bay level, Station level, Benefits, role of substations in smart grid, Volt/VAR control equipment inside substation

**UNIT IV SMART TRANSMISSION SYSTEMS**

Energy Management systems, History, current technology, EMS for the smart grid, Synchro Phasor Measurement Units (PMUs), Wide Area Monitoring Systems (WAMS), protection & Control (WAMPC), needs in smart grid, Role of WAMPC smart grid, Drivers and benefits, Role of transmission systems in smart grid

**UNIT V SMART DISTRIBUTION SYSTEMS**

DMS, DSCADA, trends in DSCADA and control, current and advanced DMSs, Voltage fluctuations, effect of voltage on customer load, Drivers, objectives and benefits, voltage-VAR control, VAR control equipment on distribution feeders, implementation and optimization, FDIR - Fault Detection

Isolation and Service restoration (FDIR), faults, objectives and benefits, equipment, implementation

**Textbooks:**

1. Stuart Borlase, Smart Grids - Infrastructure, Technology and Solutions, CRC Press, 1e, 2013
2. Gil Masters, Renewable and Efficient Electric Power System, Wiley–IEEE Press, 2e, 2013.

**Reference Books:**

1. A.G. Phadke and J.S. Thorp, Synchronized Phasor Measurements and their Applications, Springer Edition, 2e, 2017.
2. T. Ackermann, Wind Power in Power Systems, Hoboken, NJ, USA, John Wiley, 2e, 2012.

**Online Learning Resources:**

1. [https://onlinecourses.nptel.ac.in/noc22\\_ee82/preview](https://onlinecourses.nptel.ac.in/noc22_ee82/preview)

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**B.Tech IV-I Sem**

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**(20A03605c) INTRODCUTION TO ROBOTICS**

**(Open Elective-II)**

**Course Objectives:**

- 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

**Course Outcomes:**

After completing the course, the student will be able to,

- Explain fundamentals of Robots
- Apply kinematics and differential motions and velocities
- Demonstrate control of manipulators
- Understand robot vision
- Develop robot cell design and programming

**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, Differential motions and velocities of robot

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

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.

**UNIT V**            Robot Cell Design and Programming

Robot cell layouts-Robot centred cell, In-line robot cell, considerations in work cell design, work cell control, interlocks, error detection, work cell controller. methods of robot programming, WAIT, SIGNAL, and DELAY commands, Robotic languages, VAL system.

**Textbooks:**

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.

**References:**

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. Schilling, Fundamentals of Robotics: Analysis and control, Prentice-Hall Of India Pvt. Limited, 1996.

**Online Learning Resources:**

<https://nptel.ac.in/courses/108105088>

<https://nptel.ac.in/courses/108105063>

<https://nptel.ac.in/courses/108105062>

<https://nptel.ac.in/courses/112104288>

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**B.Tech IV-I Sem**

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**(20A04605) SIGNAL PROCESSING**  
**(Open Elective Course –II)**

**Course objectives:**

- Understand, represent and classify continuous time and discrete time signals and systems, together with the representation of LTI systems.
- Ability to represent continuous time signals (both periodic and non-periodic) in the time domain, sdomain and the frequency domain
- Understand the properties of analog filters, and have the ability to design Butterworth filters
- Understand and apply sampling theorem and convert a signal from continuous time to discrete time or from discrete time to continuous time (without loss of information)
- Able to represent the discrete time signal in the frequency domain
- Able to design FIR and IIR filters to meet given specifications

**Course Outcomes:**

- Understand and explain continuous time and discrete time signals and systems, in time and frequency domain
- Apply the concepts of signals and systems to obtain the desired parameter/ representation
- Analyse the given system and classify the system/arrive at a suitable conclusion
- Design analog/digital filters to meet given specifications
- Design and implement the analog filter using components/ suitable simulation tools
- Design and implement the digital filter using suitable simulation tools, and record the input and output of the filter for the given audio signal

**UNIT I**

Signal Definition, Signal Classification, System definition, System classification, for both continuous time and discrete time. Definition of LTI systems

**UNIT II**

Introduction to Fourier Transform, Fourier Series, Relating the Laplace Transform to Fourier Transform, Frequency response of continuous time systems

**UNIT III**

Frequency response of ideal analog filters, Salient features of Butterworth filters Design and implementation of Analog Butterworth filters to meet given specifications

**UNIT IV**

Sampling Theorem- Statement and proof, converting the analog signal to a digital signal. Practical sampling. The Discrete Fourier Transform, Properties of DFT. Comparing the frequency response of analog and digital systems.

**UNIT V**

Definition of FIR and IIR filters. Frequency response of ideal digital filters  
 Transforming the Analog Butterworth filter to the Digital IIR Filter using suitable mapping techniques, to meet given specifications. Design of FIR Filters using the Window technique, and the frequency sampling technique to meet given specifications Comparing the designed filter with the desired filter frequency response

**Textbooks:**

1. 'Signals and Systems', by Simon Haykin and Barry Van Veen, Wiley.

**References:**

1. 'Theory and Application of Digital Signal Processing', Rabiner and Gold
2. 'Signals and Systems', Schaum's Outline series
3. 'Digital Signal Processing', Schaum's Outline series

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**(20A04606) BASIC VLSI DESIGN**

**Course Objectives:**

- Understand the fundamental aspects of circuits in silicon
- Relate to VLSI design processes and design rules

**Course Outcomes:**

- Identify the CMOS layout levels, and the design layers used in the process sequence.
- Describe the general steps required for processing of CMOS integrated circuits.
- Design static CMOS combinational and sequential logic at the transistor level.
- Demonstrate different logic styles such as complementary CMOS logic, pass-transistor Logic, dynamic logic, etc.
- Interpret the need for testability and testing methods in VLSI.

**UNIT I**

Moore's law, speed power performance, nMOS fabrication, CMOS fabrication: n-well, pwell processes, BiCMOS, Comparison of bipolar and CMOS. Basic Electrical Properties of MOS And BiCMOS Circuits: Drain to source current versus voltage characteristics, threshold voltage, transconductance.

**UNIT II**

Basic Electrical Properties of MOS And BiCMOS Circuits: nMOS inverter, Determination of pull up to pull down ratio: nMOS inverter driven through one or more pass transistors, alternative forms of pull up, CMOS inverter, BiCMOS inverters, latch up. Basic Circuit Concepts: Sheet resistance, area capacitance calculation, Delay unit, inverter delay, estimation of CMOS inverter delay, super buffers, BiCMOS drivers.

**UNIT III**

MOS and BiCMOS Circuit Design Processes: MOS layers, stick diagrams, nMOS design style, CMOS design style Design rules and layout & Scaling of MOS Circuits:  $\lambda$  - based design rules, scaling factors for device parameters

**UNIT IV**

Subsystem Design and Layout-1: Switch logic pass transistor, Gate logic inverter, NAND gates, NOR gates, pseudo nMOS, Dynamic CMOS Examples of structured design: Parity generator, Bus arbitration, multiplexers, logic function block, code converter.

**UNIT V**

Subsystem Design and Layout-2: Clocked sequential circuits, dynamic shift registers, bus lines, General considerations, 4-bit arithmetic processes, 4-bit shifter, Regularity Definition & Computation Practical aspects and testability: Some thoughts of performance, optimization and CAD tools for design and simulation.

**Textbooks:**

1. "Basic VLSI Design", Douglas A Pucknell, Kamran Eshraghian, 3 rd Edition, Prentice Hall of India publication, 2005.

**References:**

1. "CMOS Digital Integrated Circuits, Analysis And Design", Sung – Mo (Steve) Kang, Yusuf Leblebici, Tata McGraw Hill, 3 rd Edition, 2003.
2. "VLSI Technology", S.M. Sze, 2nd edition, Tata McGraw Hill, 2003



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**(20A27605) FOOD REFRIGERATION AND COLD CHAIN MANAGEMENT**  
**OPEN ELECTIVE II**

**Course Objectives:**

- To know the equipment available to store perishable items for a long time
- To understand to increase the storage life of food items

**Course Outcomes**

By the end of the course, the students will

- Understand various principles and theories involved in refrigeration systems
- Understand the different equipment useful to store the food items for a long period.
- Understand how to increase the storage life of food items

**UNIT I**

Principles of refrigeration: Definition, background with second law of thermodynamics, unit of refrigerating capacity, coefficient of performance; Production of low temperatures: Expansion of a liquid with flashing, reversible/ irreversible adiabatic expansion of a gas/ real gas, thermoelectric cooling, adiabatic demagnetization; Air refrigerators working on reverse Carnot cycle: Carnot cycle, reversed Carnot cycle, selection of operating temperatures;

**UNIT II**

Air refrigerators working on Bell Coleman cycle: Reversed Brayton or Joule or Bell Coleman cycle, analysis of gas cycle, polytropic and multistage compression; Vapour refrigeration: Vapor as a refrigerant in reversed Carnot cycle with p-V and T-s diagrams, limitations of reversed Carnot cycle; Vapour compression system: Modifications in reverse Carnot cycle with vapour as a refrigerant (dry vs wet compression, throttling vs isentropic expansion), representation of vapor compression cycle on pressure- enthalpy diagram, super heating, sub cooling;

**UNIT III**

Liquid-vapour regenerative heat exchanger for vapour compression system, effect of suction vapour super heat and liquid sub cooling, actual vapour compression cycle; Vapour-absorption refrigeration system: Process, calculations, maximum coefficient of performance of a heat operated refrigerating machine, Common refrigerants and their properties: classification, nomenclature, desirable properties of refrigerants- physical, chemical, safety, thermodynamic and economical; Azeotropes; Components of vapour compression refrigeration system, evaporator, compressor, condenser and expansion valve;

**UNIT IV**

Ice manufacture, principles and systems of ice production, Treatment of water for making ice, brines, freezing tanks, ice cans, air agitation, quality of ice; Cold storage: Cold store, design of cold storage for different categories of food resources, size and shape, construction and material, insulation, vapour barriers, floors, frost-heave, interior finish and fitting, evaporators, automated cold stores, security of operations; Refrigerated transport: Handling and distribution, cold chain, refrigerated product handling, order picking, refrigerated vans, refrigerated display;

**UNIT V**

Air-conditioning: Meaning, factors affecting comfort air-conditioning, classification, sensible heat factor, industrial air-conditioning, problems on sensible heat factor; Winter/summer/year round air-conditioning, unitary air-conditioning systems, central air-conditioning, physiological principles in air-conditioning, air distribution and duct design methods; design of complete air-conditioning systems; humidifiers and dehumidifiers; Cooling load calculations: Load sources, product cooling, conducted heat, convected heat, internal heat sources, heat of respiration, peak load; etc.

**Textbooks:**

1. Arora, C. P. "Refrigeration and Air Conditioning". Tata MC Graw Hill Publishing Co.Ltd., New Delhi. 1993.

**References:**

1. Adithan, M. and Laroia, S. C. "Practical Refrigeration and Air Conditioning". Wiley Estern Ltd., New Delhi 1991

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**(20A54701) WAVELET TRANSFORMS AND ITS APPLICATIONS**

**(Open Elective-II)**

**Course Objectives:**

This course provides the students to understand Wavelet transforms and its applications.

**Course Outcomes:**

- Understand wavelets and wavelet expansion systems.
- Illustrate the multi resolution analysis and scaling functions.
- Form fine scale to coarse scale analysis.
- Find the lattices and lifting.
- Perform numerical complexity of discrete wavelet transforms.
- Find the frames and tight frames using fourier series.

**UNIT I** Wavelets

Wavelets and Wavelet Expansion Systems - Wavelet Expansion- Wavelet Transform- Wavelet System- More Specific Characteristics of Wavelet Systems -Haar Scaling Functions and Wavelets - effectiveness of Wavelet Analysis -The Discrete Wavelet Transform the Discrete-Time and Continuous Wavelet Transforms.

**UNIT II** A Multiresolution Formulation of Wavelet Systems

Signal Spaces -The Scaling Function -Multiresolution Analysis - The Wavelet Functions - The Discrete Wavelet Transform- A Parseval's Theorem - Display of the Discrete Wavelet Transform and the Wavelet Expansion.

**UNIT III** Filter Banks and the Discrete Wavelet Transform

Analysis - From Fine Scale to Coarse Scale- Filtering and Down-Sampling or Decimating -Synthesis - From Coarse Scale to Fine Scale -Filtering and Up-Sampling or Stretching - Input Coefficients - Lattices and Lifting - -Different Points of View.

**UNIT IV** Time-Frequency and Complexity

Multiresolution versus Time-Frequency Analysis- Periodic versus Nonperiodic Discrete Wavelet Transforms -The Discrete Wavelet Transform versus the Discrete-Time Wavelet Transform- Numerical Complexity of the Discrete Wavelet Transform.

**UNIT V** Bases and Matrix Examples

Bases, Orthogonal Bases, and Biorthogonal Bases -Matrix Examples - Fourier Series Example - Sine Expansion Example - Frames and Tight Frames - Matrix Examples -Sine Expansion as a Tight

Frame Example.

**Textbooks:**

1. C. Sidney Burrus, Ramesh A. Gopinath, "Introduction to Wavelets and Wavelets Transforms", Prentice Hall, (1997).
2. James S. Walker, "A Primer on Wavelets and their Scientific Applications", CRC Press, (1999).

**Reference Books:**

1. Raghuvveer Rao, "Wavelet Transforms", Pearson Education, Asia.

Online Learning Resources:

<https://www.slideshare.net/RajEndiran1/introduction-to-wavelet-transform-51504915>

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B.Tech III-II Sem

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## (20A56701) PHYSICS OF ELECTRONIC MATERIALS AND DEVICES

(Open Elective-II)

**Course Objectives:**

- To impart the fundamental knowledge on various materials, their properties and applications.
- To provide insight into various semiconducting materials, and their properties.
- To enlighten the characteristic behavior of various semiconductor devices.
- To provide the basics of dielectric and piezoelectric materials and their properties.
- To explain different categories of magnetic materials, mechanism and their advanced applications.

**Course Outcome:** At the end of the course the student will be able

- To understand the fundamentals of various materials.
- To exploit the physics of semiconducting materials
- To familiarize with the working principles of semiconductor-based devices.
- To understand the behaviour of dielectric and piezoelectric materials.
- To identify the magnetic materials and their advanced applications.

**UNIT I Fundamentals of Materials Science**

Introduction, Phase rule, Phase Diagram, Elementary idea of Nucleation and Growth, Methods of crystal growth. Basic 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).

**UNIT II Semiconductors**

Introduction, charge carriers in semiconductors, effective mass, Diffusion and drift, Diffusion and recombination, Diffusion length. The Fermi level & Fermi-Dirac distribution, Electron and Hole in quantum well, Change of electron-hole concentration- Qualitative analysis, Temperature dependency of carrier concentration, Conductivity and mobility, Effects of temperature and doping on mobility, High field effects.

**UNIT III Physics of Semiconductor devices**

Introduction, Band structure, PN junctions and their typical characteristics under equilibrium and under bias, Construction and working principles of: Light emitting diodes, Heterojunctions, Transistors, FET and MOSFETs.

**UNIT IV Dielectric Materials and their applications:**

Introduction, Dielectric properties, Electronic polarizability and susceptibility, Dielectric constant and frequency dependence of polarization, Dielectric strength and dielectric loss, Piezoelectric properties.

**UNIT V Magnetic Materials and their applications**

Introduction, Magnetism & various contributions to para and dia magnetism, Ferro and Ferri magnetism and ferrites, Concepts of Spin waves and Magnons, Anti-ferromagnetism, Domains and domain walls, Coercive force, Hysteresis, Nano-magnetism, Super-paramagnetism – Properties and applications.

**Textbooks**

1. Principles of Electronic Materials and Devices- S.O. Kasap, McGraw-Hill Education (India) Pvt. Ltd., 3rd edition, 2007.
2. Electronic Components and Materials- Grover and Jamwal, Dhanpat Rai and Co.

**Reference Books:**

1. Solid State Electronic Devices -B.G. Streetman and S. Banerjee, PHI Learning, 6th edition
2. Electronic Materials Science- Eugene A. Irene, , Wiley, 2005
3. An Introduction to Electronic Materials for Engineers-Wei Gao, Zhengwei Li, Nigel Sammes, World Scientific Publishing Co. Pvt. Ltd., , 2nd Edition,2011
4. A First Course In Material Science- by Raghvan, McGraw Hill Pub.
5. The Science and Engineering of materials- Donald R.Askeland, Chapman& Hall Pub.

**NPTEL courses links**

<https://nptel.ac.in/courses/113/106/113106062/>

[https://onlinecourses.nptel.ac.in/noc20\\_mm02/preview](https://onlinecourses.nptel.ac.in/noc20_mm02/preview), <https://nptel.ac.in/noc/courses/noc17/SEM1/noc17-mm07>

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## (20A51701) CHEMISTRY OF POLYMERS AND ITS APPLICATIONS

**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

**Course Outcome**

- At the end of the course, the student will be able to:
- Understand the state of art synthesis of Polymeric materials
- Understand the hydro gels preparation, properties and applications in drug delivery system.
- Characterize polymers materials using IR, NMR, XRD.
- Analyze surface phenomenon fo micelles and characterise using photoelectron spectroscopy, ESCA and Auger spectroscopy

**UNIT I : Polymers-Basics and Characterization**

Basic concepts: monomers, repeat units, degree of polymerization, linear, branched and network polymers, classification of polymers, Polymerization: condensation, addition, radical chain, ionic and coordination and copolymerization. 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.

**Unit II : 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 of Polymers based on different types of monomers, Olefin polymers, Diene polymers, nylons, Urea - formaldehyde, phenol - formaldehyde and melamine Epoxy and Ion exchange resins. Characterization of polymers by IR, NMR, XRD.

**UNIT III : Natural Polymers & Modified cellulotics**

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 cellulotics: Cellulose esters and ethers such as Ethyl cellulose, CMC, HPMC, cellulose acetals, Liquid crystalline polymers; specialty plastics- PES, PAES, PEEK, PEAK.

Learning Outcomes:

**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.

**UNIT V : 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.

**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 – Gowarikar
6. Physical Chemistry –Galston
7. Drug Delivery- Ashim K. Misra

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**(20A01704) COST EFFECTIVE HOUSING TECHNIQUES**

**(Open Elective Course - III)**

**Course Objectives:**

- To understand the requirements of structural safety for future construction.
- To know about the housing scenario, housing financial systems land use and physical planning for housing and housing the urban poor
- To know the traditional practices of rural housing
- To know the different innovative cost effective construction techniques
- To know the alternative building materials for low cost housing.

**Course Outcomes :**

- To know the repair and restore action of earthquake damaged non engineered buildings and ability to understand the requirements of structural safety for future construction
- To know about the housing scenario, housing financial systems land use and physical planning for housing and housing the urban poor
- Apply the traditional practices of rural housing
- Understand the different innovative cost effective construction techniques
- Suggest the alternative building materials for low cost housing

**UNIT I**

- a) **Housing Scenario** :Introducing - Status of urban housing - Status of Rural Housing
- b) **Housing Finance**: Introducing - Existing finance system in India - Government role as facilitator - Status at Rural Housing Finance - Impedimently in housing finance and related issues
- c) **Land use and physical planning for housing** :Introduction - Planning of urban land - Urban land ceiling and regulation act - Efficiency of building bye lass - Residential Densities
- d) **Housing the urban poor** :Introduction - Living conditions in slums - Approaches and strategies for housing urban poor

**UNIT II**

**Development and adoption of low cost housing technology**

Introduction - Adoption of innovative cost effective construction techniques - Adoption of precast elements in partial prefabrication - Adopting of total prefabrication of mass housing in India- General remarks on pre cast roofing/flooring systems -Economical wall system - Single Brick thick load bearing wall - 19cm thick load bearing masonry walls - Half brick thick load bearing wall – Fly-ash gypsum thick for masonry - Stone Block masonry - Adoption of precast R.C. plank and join system for roof/floor in the building

**UNIT III**

**Alternative building materials for low cost housing**

Introduction - Substitute for scarce materials – Ferro-cement - Gypsum boards - Timber substitutions



- Industrial wastes - Agricultural wastes - alternative building maintenance

**Low cost Infrastructure services:**

Introduce - Present status - Technological options - Low cost sanitation - Domestic wall - Water supply, energy

**UNIT IV**

**Rural Housing:** Introduction traditional practice of rural housing continuous - Mud Housing technology Mud roofs - Characteristics of mud - Fire treatment for thatch roof - Soil stabilization - Rural Housing programs

**UNIT V**

**Housing in Disaster prone areas:**

Introduction – Earthquake - Damages to houses - Traditional prone areas - Type of Damages and Railways of non-engineered buildings - Repair and restore action of earthquake Damaged non-engineered buildings recommendations for future constructions. Requirement's of structural safety of thin precast roofing units against Earthquake forces Status of R& D in earthquake strengthening measures - Floods, cyclone, future safety

**Textbooks:**

1. Building materials for low – income houses – International council for building research studies and documentation.
2. Hand book of low cost housing by A.K.Lal – Newage international publishers.
3. Low cost Housing – G.C. Mathur by South Asia Books

**Reference Books:**

1. Properties of concrete – Neville A.m. Pitman Publishing Limited, London.
2. Light weight concrete, Academic Kiado, Rudhai.G – Publishing home of Hungarian Academy of Sciences 1963.
3. Modern trends in housing in developing countries – A.G. Madhava Rao, D.S. Rama chandra Murthy &G.Annamalai. E. & F. N. Spon Publishers

**Online Learning Resources:**

<https://nptel.ac.in/courses/124107001>

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR**

**B.Tech IV-I Sem**

**L T P C**

**3 0 0 3**

**(20A02704) IoT APPLICATIONS IN ELECTRICAL ENGINEERING**

**(Open Elective Course – III)**

**Course Objectives:**

- Understand basics of Internet of Things and Micro Electro Mechanical Systems (MEMS) fundamentals in design and fabrication process
- Analyze motion less and motion detectors in IoT applications
- Understand about Analyze applications of IoT in smart grid
- Apply the concept of Internet of Energy for various applications

**Course Outcomes:**

- Understand the concept of IoT in Electrical Engineering
- Analyze various types of motionless sensors and various types of motion detectors
- Apply various applications of IoT in smart grid
- Design future working environment with Energy internet

**UNIT I                   SENSORS**

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

**UNIT II                   OCCUPANCY AND MOTION DETECTORS**

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

**UNIT III                   MEMS**

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

**UNIT IV                   IoT FOR SMART GRID**

Driving factors, Generation level, Transmission level, Distribution level, Applications, Metering and monitoring applications, Standardization and interoperability, Smart home

**UNIT V                   INTERNET of ENERGY (IoE)**

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

**Textbooks:**

1. Jon S. Wilson, Sensor Technology Hand book, Newnes Publisher, 2004
2. Tai Ran Hsu, MEMS and Microsystems: Design and manufacture, 1<sup>st</sup> Edition, Mc Grawhill Education, 2017
3. Ersan Kabalci and Yasin Kabalci, From Smart grid to Internet of Energy, 1<sup>st</sup> Edition, Academic Press, 2019

**Reference Books:**

1. Raj Kumar Buyya and Amir Vahid Dastjerdi, 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, 1<sup>st</sup> Edition, CRC Press, 2019
3. RMD Sundaram Shriram, K. Vasudevan and Abhishek S. Nagarajan, Internet of Things, Wiley, 2019

**Online Learning Resources:**

1. [https://onlinecourses.nptel.ac.in/noc22\\_cs96/preview](https://onlinecourses.nptel.ac.in/noc22_cs96/preview)
2. <https://nptel.ac.in/courses/108108123>
3. <https://nptel.ac.in/courses/108108179>

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR**  
**B.Tech IV-I Sem** **L T P C**  
**3 0 0 3**  
**(20A03704) PRODUCT DESIGN AND DEVELOPMENT**  
**(Open Elective-III)**

**Course Objectives:**

- To Design products creatively while applying engineering design principles.
- To Apply principles of human factors, ethics and environmental factors in product design.
- To Work in groups or individually in their pursuit of innovative product design.
- To implement value design for optimum product cost.

**Course Outcomes:** After successful completion of the course, the student will be able to

- Apply knowledge of basic science and engineering fundamentals
- Undertake problem identification, formulation and solution
- Understanding of the principles of sustainable design and development
- Understanding of professional and ethical responsibilities and commitment to them

**UNIT I** Product Development Process

General problem-solving process - Flow of Work during the process of designing - Activity Planning Timing and scheduling, Planning Project and Product Costs - Effective Organization Structures - Interdisciplinary Cooperation, Leadership and Team behaviour.

**UNIT II** Task Clarification

Importance of Task Clarification - Setting up a requirements list - Contents, Format, Identifying the requirements, refining and extending the requirements, Compiling the requirements list, Examples. Using requirements lists - Updating, Partial requirements lists, Further uses - Practical applications of requirements lists.

**UNIT III** Conceptual Design

Steps in Conceptual Design. Abstracting to identify the essential problems - Aim of Abstraction, Broadening the problem. Formulation, Identifying the essential problems from the requirements list, establishing functions structures, Overall function, Breaking a function down into sub-functions. Developing working structures - Searching for working principles, Combining Working Principles, Selecting Working Structures, Practical Application of working structures. Developing Concepts - Firming up into principle solution variants, Evaluating principle solution variants, Practical Applications of working structures. Examples of Conceptual Design - One Handed Household Water Mixing Tap, Impulse - Loading Test Rig.

**UNIT IV** Embodiment Design

Steps of Embodiment Design, Checklist for Embodiment Design Basic rules of Embodiment Design Principles of Embodiment Design - Principles of Force Transformations, Principles of Division of Tasks, Principles of Self-Help, Principles of Stability and Bi-Stability, Principles of Fault-Free Design Guide for Embodiment Design - General Considerations, Design to allow for expansion, Design to allow for creep and relaxation, Design against Corrosion, Design to minimize wear, Design to Ergonomics, Design for Aesthetics, Design for Production, Design for Assembly, Design for Maintenance, Design for Recycling, Design for Minimum risk, Design to standards. Evaluation of Embodiment Designs.

**UNIT V** Mechanical Connections, Mechatronics And Adaptronics:

Mechanical Connections - General functions and General Behaviour, Material connections, From Connections, Force connections, Applications. Mechatronics - General Architecture and Terminology, Goals and Limitations, Development of Mechatronic Solution, Examples. Adaptronics - Fundamentals and Terminology, Goals and Limitations, Development of Adaptronics Solutions, Examples.

**Textbooks:**

1. G.Paul; W. Beitzetal, Engineering Design, Springer International Education, 2010.

2. Kevin Otto: K. Wood, Product Design And Development, Pearson Education, 2013.

**References:**

1. Kenith B. Kahu, Product Planning Essentials, Yes dee Publishing, 2011.
2. K.T. Ulrich, Product Design and Development, TMH Publishers, 2011.

**Online Learning Resources:**

- <https://nptel.ac.in/courses/112107217>
- <https://nptel.ac.in/courses/112104230>
- <https://www.youtube.com/watch?v=mvaqZAFdL6U>
- <https://nptel.ac.in/courses/107103082>
- <https://quizxp.com/nptel-product-design-and-manufacturing-assignment-5/>

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR**  
**B.Tech IV-I Sem**

**L T P C**  
**3 0 0 3**

**(20A04704) ELECTRONIC SENSORS**  
**(Open Elective Course –III)**

**Course Objectives:**

- Learn the characterization of sensors.
- Known the working of Electromechanical, Thermal, Magnetic and radiation sensors
- Understand the concepts of Electro analytic and smart sensors
- Able to use sensors in different applications

**Course Outcomes:**

- Learn about sensor Principle, Classification and Characterization.
- Explore the working of Electromechanical, Thermal, Magnetic, radiation and Electro analytic sensors
- Understand the basic concepts of Smart Sensors
- Design a system with sensors

**UNIT I**

**Sensors / Transducers:** Principles, Classification, Parameters, Characteristics, Environmental Parameters (EP), Characterization

**Electromechanical Sensors:** Introduction, Resistive Potentiometer, Strain Gauge, Resistance Strain Gauge, Semiconductor Strain Gauges -Inductive Sensors: Sensitivity and Linearity of the Sensor – Types-Capacitive Sensors: Electrostatic Transducer, Force/Stress Sensors Using Quartz Resonators, Ultrasonic Sensors

**UNIT II**

**Thermal Sensors:** Introduction, Gas thermometric Sensors, Thermal Expansion Type Thermometric Sensors, Acoustic Temperature Sensor ,Dielectric Constant and Refractive Index thermo sensors, Helium Low Temperature Thermometer ,Nuclear Thermometer ,Magnetic Thermometer ,Resistance Change Type Thermometric Sensors, Thermo emf Sensors, Junction Semiconductor Types, Thermal Radiation Sensors, Quartz Crystal Thermoelectric Sensors, NQR Thermometry, Spectroscopic Thermometry, Noise Thermometry, Heat Flux Sensors

**UNIT III**

**Magnetic sensors:** Introduction, Sensors and the Principles Behind, Magneto-resistive Sensors, Anisotropic Magneto resistive Sensing, Semiconductor Magneto resistors, Hall Effect and Sensors, Inductance and Eddy Current Sensors, Angular/Rotary Movement Transducers, Synchros.

**UNIT IV**

**Radiation Sensors:** Introduction, Basic Characteristics, Types of Photo resistors/ Photo detectors, Xray and Nuclear Radiation Sensors, Fibre Optic Sensors

**Electro analytical Sensors:** The Electrochemical Cell, The Cell Potential - Standard Hydrogen Electrode (SHE), Liquid Junction and Other Potentials, Polarization, Concentration Polarization, Reference Electrodes, Sensor Electrodes, Electro ceramics in Gas Media.

**UNIT V**

**Smart Sensors:** Introduction, Primary Sensors, Excitation, Amplification, Filters, Converters, Compensation, Information Coding/Processing - Data Communication, Standards for Smart Sensor Interface, the Automation Sensors –Applications: Introduction, On-board Automobile Sensors (Automotive Sensors), Home Appliance Sensors, Aerospace Sensors, Sensors for Manufacturing –Sensors for environmental Monitoring

**Textbooks:**

1. “Sensors and Transducers - D. Patranabis” –PHI Learning Private Limited., 2003.
2. Introduction to sensors- John veteline, aravindraghu, CRC press, 2011

**References:**

1. Sensors and Actuators, D. Patranabis, 2nd Ed., PHI, 2013.
2. Make sensors: Terokarvinen, kemo, karvinen and villeyvaltokari, 1st edition, maker media,2014.
3. Sensors handbook- Sabriesoloman, 2nd Ed. TMH, 2009

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR**

**B.Tech**

**L T P C**  
**3 0 0 3**

**(20A04506) PRINCIPLES OF COMMUNICATION SYSTEMS**

**Course Objectives:**

- To understand the concept of various modulation schemes and multiplexing.
- To apply the concept of various modulation schemes to solve engineering problems.
- To analyse various modulation schemes.
- To evaluate various modulation scheme in real time applications.

**Course Outcomes:**

- Understand the concept of various modulation schemes and multiplexing
- Apply the concept of various modulation schemes to solve engineering problems
- Analyse various modulation schemes, and evaluate various modulation scheme in real time applications

**UNIT I Amplitude Modulation**

Introduction to Noise and Fourier Transform. An overview of Electronic Communication Systems. Need for Frequency Translation, Amplitude Modulation: DSB-FC, DSB-SC, SSB-SC and VSB. Frequency Division Multiplexing. Radio Transmitter and Receiver.

**UNIT II Angle Modulation**

Angle Modulation, Tone modulated FM Signal, Arbitrary Modulated FM Signal, FM Modulation and Demodulation. Stereophonic FM Broadcasting.

**UNIT III Pulse Modulation**

Sampling Theorem: Low pass and Band pass Signals. Pulse Amplitude Modulation and Concept of Time Division Multiplexing. Pulse Width Modulation. Digital Representation of Analog Signals.

**UNIT IV Digital Modulation**

Binary Amplitude Shift Keying, Binary Phase Shift Keying and Quadrature Phase Shift Keying, Binary Frequency Shift Keying. Regenerative Repeater.

**UNIT V Communication Systems**

Satellite, RADAR, Optical, Mobile and Computer Communication (Block diagram approach only).

Note: The main emphasis is on qualitative treatment. Complex mathematical treatment may be avoided.

**Textbooks:**

1. Herbert Taub, Donald L Schilling and Goutam Saha, "Principles of Communication Systems", 3<sup>rd</sup>Edition, Tata McGraw-Hill Publishing Company Ltd., 2008.

**References:**

1. B. P. Lathi, Zhi Ding and Hari M. Gupta, "Modern Digital and Analog Communication Systems", 4<sup>th</sup> Edition, Oxford University Press, 2017.
2. K. Sam Shanmugam "Digital and Analog Communication Systems", Wiley India Edition, 2008.

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR**

**B.Tech IV-I Sem**

**L T P C**

**3 0 0 3**

**(20A27704) HUMAN NUTRITION  
(OPEN ELECTIVE-III)**

**Course Objectives:**

- To get knowledge on Concepts and content of nutrition source and metabolic functions.
- To know about Balanced diets for various groups; Diets and disorders, recommended dietary allowances
- To learn about Epidemiology of under nutrition and over nutrition.
- To understand Nutrition and immunity.

**Course Outcomes:**

- To study the Salient features of Concepts and content of nutrition, Malnutrition, Nutrition education
- Assessment of nutritional status, disorders Food fad and faddism.

**UNIT I**

Concepts and content of nutrition: Nutrition agencies; Nutrition of community; Nutritional policies and their implementation; Metabolic function of nutrients. Nutrients: Sources, functions, digestion, absorption, assimilation and transport of carbohydrates, proteins and fats in human beings;

**UNIT II**

Water and energy balance: Water intake and losses; Basal metabolism- BMR; Body surface area and factors affecting BMR Formulation of diets: Classification of balanced diet; Balanced diets for various groups; Diets and disorders. Recommended dietary allowances (RDA); For various age group; According physiological status; Athletic and sports man; Geriatric persons

**UNIT III**

Malnutrition: Type of Malnutrition; Multi-factorial causes; Epidemiology of under nutrition and over nutrition; Nutrition and immunity.

**UNIT IV**

Nutrition education Assessment of nutritional status: Diet surveys; Anthropometry; Clinical examination; Biochemical assessment; Additional medical information

**UNIT V**

Blood constituents; Hormone types; Miscellaneous disorders Food fad and faddism. Potentially toxic substances in human food.

**Textbooks:**

1. Swaminathan M, Advanced Text Book on Food & Nutrition (Volume I and II) , The Bangalore Printing and Publishing Co.Ltd, Bangalore. 2006
2. Stewart Truswell, ABC of Nutrition (4th edition) , BMJ Publishing Group 2003, ISBN 0727916645.
3. Martin Eastwood, Principles of Human Nutrition , Blackwell Publishing, Boca Rotan

**Reference:**

1. Mike Lean and E. Combet ,Barasi's Human Nutrition – A Health Perspective , Second Edition CRC Press, London
2. Introduction to Human Nutrition, Micheal J. G., Susan A.L. Aedin C. and Hester H.V, Wiley-Blackwell Publication, UK 2009 , ISBN 9781405168076
3. Bogert L.J., Goerge M.B, Doris H.C., Nutrition and Physical Fitness, W.B. Saunders Company, Toronto, Canada



**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR**

**B.Tech IV-I Sem**

**L T P C**  
**3 0 0 3**

**(20A54702) NUMERICAL METHODS FOR ENGINEERS**

**(OPEN ELECTIVE-III)**

**Course Objectives:**

This course aims at providing the student with the knowledge on various numerical methods for solving equations, interpolating the polynomials, evaluation of integral equations and solution of differential equations.

**Course Outcomes:**

- Apply numerical methods to solve algebraic and transcendental equations.
- Understand fitting of several kinds of curves.
- Derive interpolating polynomials using interpolation formulae.
- Solve differential and integral equations numerically.

**UNIT I                      Solution of Algebraic & Transcendental Equations**

Introduction-Bisection Method-Iterative method-Regula falsi method-Newton Raphson method.  
System of Algebraic equations: Gauss Jordan method-Gauss Siedal method.

**UNIT II                      Curve Fitting**

Principle of Least squares- Fitting of curves- Fitting of linear, quadratic and exponential curves.

**UNIT III                      Interpolation**

Finite differences-Newton's forward and backward interpolation formulae – Lagrange's formulae  
Gauss forward and backward formula, Stirling's formula, Bessel's formula

**UNIT IV                      Numerical Integration**

Numerical Integration: Trapezoidal rule – Simpson's 1/3 Rule – Simpson's 3/8 Rule

**UNIT V                      Solution of Initial value problems to Ordinary differential equations**

Numerical solution of Ordinary Differential equations: Solution by Taylor's series-Picard's Method of successive Approximations-Modified Euler's Method-Runge-Kutta Methods.

**Textbooks:**

1. Higher Engineering Mathematics, B.S.Grewal, Khanna publishers.
2. Probability and Statistics for Engineers and Scientists, Ronald E. Walpole, PNIE.
3. Advanced Engineering Mathematics, by Erwin Kreyszig, Wiley India

**Reference Books:**

1. Higher Engineering Mathematics, by B.V.Ramana, Mc Graw Hill publishers.
2. Advanced Engineering Mathematics, by Alan Jeffrey, Elsevier.

**Online Learning Resources:**

<https://slideplayer.com/slide/8588078/>

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR**

**B.Tech IV-I Sem**

**L T P C**

**3 0 0 3**

**(20A56702) SENSORS AND ACTUATORS FOR ENGINEERING APPLICATIONS  
(OPEN ELECTIVE-III)**

**Course Objectives:**

- To provide exposure to various kinds of sensors and actuators and their engineering applications.
- To impart knowledge on the basic laws and phenomenon behind the working of sensors and actuators
- To enlighten the operating principles of various sensors and actuators
- To educate the fabrication of sensors
- To identify the required sensor and actuator for interdisciplinary application

**Course Outcomes:**

- To recognize the need of sensors and actuators
- To understand working principles of various sensors and actuators
- To identify different type of sensors and actuators used in real life applications
- To exploit basics in common methods for converting a physical parameter into an electrical quantity
- To make use of sensors and actuators for different applications

**UNIT I Introduction to Sensors and Actuators**

**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.

**Actuators:** 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.

**UNIT II Temperature and Mechanical Sensors**

**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, tactile sensors, Pressure sensors: semiconductor, piezoresistive, capacitive, VRP.

**UNIT III Optical and Acoustic Sensors**

**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.

**UNIT IV Magnetic, Electromagnetic Sensors and Actuators**

Motors as actuators (linear, rotational, stepping motors), magnetic valves, inductive sensors (LVDT, RVDT, and Proximity), Hall Effect sensors, Magneto-resistive sensors, Magneto-strictive sensors and actuators, Voice coil actuators (speakers and speaker-like actuators).

**UNIT V Chemical and Radiation Sensors**

**Chemical Sensors:** Principle and working of Electro-chemical, Thermo-chemical, Gas, pH, Humidity and moisture sensors.

**Radiation Sensors:** Principle and working of Ionization detectors, Scintillation detectors, Geiger-Mueller counters, Semiconductor radiation detectors and Microwave sensors (resonant, reflection, transmission)

**Textbooks:**

1. Sensors and Actuators – Clarence W. de Silva, CRC Press, 2<sup>nd</sup> 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

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[https://onlinecourses.nptel.ac.in/noc21\\_ee32/preview](https://onlinecourses.nptel.ac.in/noc21_ee32/preview)

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR**

**B.Tech IV-I Sem**

**L T P C**

**3 0 0 3**

**(20A51702) CHEMISTRY OF NANOMATERIALS AND APPLICATIONS**

**(OPEN ELECTIVE-III)**

**Course Objectives:**

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

**Course Outcomes:**

- 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

**UNIT I**

Introduction: Scope of nanoscience and nanotechnology, 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 nanomaterials, 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

**Textbooks:**

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

**References:**

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.

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR**  
**B.Tech IV-I Sem**

**L T P C**  
**3 0 0 3**

**(20A01705) HEALTH, SAFETY AND ENVIRONMENTAL MANAGEMENT PRACTICES**

**(Open Elective Course-IV)**

**Course Objectives:**

- To understand safety, health and environmental management.
- To be familiar with hazard classification and assessment, hazard evaluation and hazard control, environmental issues and management
- To get exposed to accidents modeling, accident investigation and reporting, concepts of HAZOP and PHA
- To be familiar with safety measures in design and process operations.
- To get exposed to risk assessment and management, principles and methods

**Course Outcomes :**

- To understand safety, health and environmental management.
- To be familiar with hazard classification and assessment, hazard evaluation and hazard control, environmental issues and management
- To get exposed to accidents modelling, accident investigation and reporting control, environmental issues and management
- To get concepts of HAZOP and PHA.
- To be familiar with safety measures in design and process operations.

**UNIT I**

Introduction to safety, health and environmental management - Basic terms and their definitions - Importance of safety - Safety assurance and assessment - Safety in design and operation - Organizing for safety.

**UNIT II**

Hazard classification and assessment - Hazard evaluation and hazard control.

Environmental issues and Management - Atmospheric pollution - Flaring and fugitive release - Water pollution - Environmental monitoring - Environmental management.

**UNIT III**

Accidents modelling - Release modelling - Fire and explosion modelling - Toxic release and dispersion Modelling

**UNIT IV**

Accident investigation and reporting - concepts of HAZOP and PHA.

Safety measures in design and process operations - Inserting, explosion, fire prevention, sprinkler systems.

## UNIT V

Risk assessment and management - Risk picture - Definition and characteristics - Risk acceptance criteria - Quantified risk assessment - Hazard assessment - Fatality risk assessment - Risk management principles and methods.

### Textbooks:

1. Process Safety Analysis, by Skelton. B, Gulf Publishing Company, Houston, 210pp., 1997.
2. Risk Management with Applications from Offshore Petroleum Industry, by Terje Aven and Jan Erik Vinnem, Springer, 200pp., 2007.

### Reference Books:

1. Introduction to Safety and Reliability of Structures, by Jorg Schneider
2. Structural Engineering Documents Vol. 5, International Association for Bridge and Structural Engineering (IABSE), 138pp., 1997.
3. Safety and Health for Engineers, by Roger L. Brauer, John Wiley and Sons Inc. pp. 645-663, 2006.
4. Health, Safety and Environmental Management in Offshore and Petroleum Engineering, Srinivasan Chandrasekaran, John Wiley and Sons, 2016.

### Online Learning Resources:

<https://nptel.ac.in/courses/114106017>



**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR**  
**B.Tech IV-I Sem** **L T P C**  
**3 0 0 3**  
**(20A02705) RENEWABLE ENERGY SYSTEMS**

**(Open Elective Course – IV)**

**Course Objectives:**

- Understand various sources of Energy and the need of Renewable Energy Systems.
- Understand the concepts of Solar Radiation, Wind energy and its applications.
- Analyze solar thermal and solar PV systems
- Understand the concept of geothermal energy and its applications, biomass energy, the concept of Ocean energy and fuel cells.

**Course Outcomes:**

- Understand various alternate sources of energy for different suitable application requirements
- Understand the concepts of solar energy generation strategies and wind energy system
- Analyze Solar and Wind energy systems
- Understand the basics of Geothermal Energy Systems, various diversified energy scenarios of ocean, biomass and fuel cells

**UNIT I                      SOLAR ENERGY**

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.

**UNIT II                      PV ENERGY SYSTEMS**

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.

**UNIT III                      WIND ENERGY**

Principle of wind energy conversion; Basic components of wind energy conversion systems; windmill 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.

**UNIT IV                      GEOTHERMAL ENERGY**

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.



## UNIT V MISCELLANEOUS ENERGY TECHNOLOGIES

**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.

### Textbooks:

1. Stephen Peake, “Renewable Energy Power for a Sustainable Future”, Oxford International Edition, 2018.
2. G. D. Rai, “Non-Conventional Energy Sources”, 4<sup>th</sup> Edition, Khanna Publishers, 2000.

### Reference Books:

1. S. P. Sukhatme, “Solar Energy”, 3<sup>rd</sup> 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”, 3<sup>rd</sup> 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.

### Online Learning Resources:

1. <https://nptel.ac.in/courses/103103206>
2. <https://nptel.ac.in/courses/108108078>

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR**

**B.Tech IV-I Sem**

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**(20A03705) INTRODUCTION TO COMPOSITE MATERIALS**

**(Open Elective-IV)**

**Course Objectives:**

- 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.

**Course Outcomes:**

- 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)

**UNIT I Introduction to composites**

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.

**UNIT II Polymer matrix composites**

Polymers - Polymer matrix materials – PMC processes - hand layup processes – spray up processes – resin transfer moulding – Pultrusion – Filament winding – Auto clave based methods - Injection moulding – sheet moulding compound – properties and applications of PMCs.

**UNIT III Metal matrix composites**

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.

**UNIT IV Ceramic matrix composites**

Ceramic matrix materials – properties – processing of CMCs –Sintering - Hot pressing – Infiltration – Lanxide process – Insitu chemical reaction techniques – solgel polymer pyrolysis –SHS - Cold isostatic pressing (CIPing) – Hot isostatic pressing (HIPing). Properties and Applications of CCMs.

**UNIT V Advances & Applications of composites**

Advantages of carbon matrix – limitations of carbon matrix carbon fibre – chemical vapour deposition of carbon on carbonfibre perform. Properties and applications of Carbon-carbon composites. Composites for aerospace applications. Bio degradability, introduction of bio composites, classification, processing of bio composites, applications of bio composites - Mechanical, Biomedical, automobile Engineering.

**Textbooks:**

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.

**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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**(20A04705) MICROCONTROLLERS & APPLICATIONS**  
**(Open Elective Course –IV)**

**Course Objectives:**

- Describe the Architecture of 8051 Microcontroller and Interfacing of 8051 to external memory.
- Write 8051 Assembly level programs using 8051 instruction set.
- Describe the Interrupt system, operation of Timers/Counters and Serial port of 8051.
- Interface simple switches, simple LEDs, ADC 0804, LCD and Stepper Motor to 8051.

**Course Outcomes:**

- Understand the importance of Microcontroller and Acquire the knowledge of Architecture of 8051 Microcontroller.
- Apply and Interface simple switches, simple LEDs, ADC 0804, LCD and Stepper Motor to using 8051 I/O ports.
- Develop the 8051 Assembly level programs using 8051 Instruction set
- Design the Interrupt system, operation of Timers/Counters and Serial port of 8051

**UNIT 1** 8051 Microcontroller:

Microprocessor Vs Microcontroller, Embedded Systems, Embedded Microcontrollers, 8051 Architecture-Registers, Pin diagram, I/O ports functions, Internal Memory organization. External Memory (ROM & RAM) interfacing.

**UNIT II**

Addressing Modes, Data Transfer instructions, Arithmetic instructions, Logical instructions, Branch instructions, Bit manipulation instructions. Simple Assembly language program examples to use these instructions.

**UNIT III**

8051 Stack, Stack and Subroutine instructions. Simple Assembly language program examples to use subroutine instructions. 8051 Timers and Counters – Operation and Assembly language programming to generate a pulse using Mode-1 and a square wave using Mode- 2 on a port pin.

**UNIT IV**

8051 Serial Communication- Basics of Serial Data Communication, RS- 232 standard, 9 pin RS232 signals, Simple Serial Port programming in Assembly and C to transmit a message and to receive data serially. 8051 Interrupts. 8051 Assembly language programming to generate an external interrupt using a switch.

**UNIT V**

8051 C programming to generate a square waveform on a port pin using a Timer interrupt. Interfacing 8051 to ADC-0804, DAC, LCD and Interfacing with relays and opto isolators, Stepper Motor Interfacing, DC motor interfacing, PWM generation using 8051.

**Textbooks:**

1. Muhammad Ali Mazidi and Janice Gillespie Mazidi and Rollin D. McKinlay; “The 8051 Microcontroller and Embedded Systems – using assembly and C”, PHI, 2006 / Pearson, 2006.
2. Kenneth J. Ayala, “The 8051 Microcontroller”, 3rd Edition, Thomson/Cengage Learning.

**References:**

1. Manish K Patel, “The 8051 Microcontroller Based Embedded Systems”, McGraw Hill, 2014, ISBN: 978-93-329-0125-4.
2. Raj Kamal, “Microcontrollers: Architecture, Programming, Interfacing and System Design”, Pearson Education, 2005.

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**B.Tech IV- I Sem**

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**(20A04706) PRINCIPLES OF CELLULAR AND MOBILE COMMUNICATIONS**

**Course Objectives:**

- To understand the concepts and operation of cellular systems.
- To apply the concepts of cellular systems to solve engineering problems.
- To analyse cellular systems for meaningful conclusions.
- To evaluate suitability of a cellular system in real time applications.
- To design cellular patterns based on frequency reuse factor.

**Course Outcomes:**

At the end of the course, the student should be able to

- Understand the concepts and operation of cellular systems (L1)
- Apply the concepts of cellular systems to solve engineering problems (L2).
- Analyse cellular systems for meaningful conclusions, Evaluate suitability of a cellular system in real time applications (L3).
- Design cellular patterns based on frequency reuse factor (L4).

**UNIT I Introduction to Cellular Mobile Systems**

Why cellular mobile communication systems? A basic cellular system, Evolution of mobile radio communications, Performance criteria, Characteristics of mobile radio environment, Operation of cellular systems. Examples for analog and digital cellular systems.

**UNIT II Cellular Radio System Design**

General description of the problem, Concept of frequency reuse channels, Cochannel interference reduction, Desired C/I ratio, Cell splitting and sectoring.

**UNIT III Handoffs and Dropped Calls**

Why handoffs and types of handoffs, Initiation of handoff, Delaying a handoff, Forced handoffs, Queuing of handoffs, Power-difference handoffs, Mobile assisted handoff and soft handoff, Cell-site handoff, Intersystem handoff. Introduction to dropped call rate.

**UNIT IV Multiple Access Techniques for Wireless Communications**

Introduction, Frequency Division Multiple Access, Time Division Multiple Access, Code Division Multiple Access and Space Division Multiple Access.

**UNIT V Digital Cellular Systems**

Global System for Mobile Systems, Time Division Multiple Access Systems, Code Division Multiple Access Systems. Examples for 2G, 3G and 4G systems. Introduction to 5G system.

**Textbooks:**

1. William C. Y. Lee, "Mobile Cellular Telecommunications", 2<sup>nd</sup> Edition, McGraw-Hill International, 1995.
2. Theodore S. Rappaport, "Wireless Communications – Principles and Practice", 2<sup>nd</sup> Edition, PHI, 2004.

**References:**

1. Aditya K. Jagannatham "Principles of Modern Wireless Communications Systems – Theory and Practice", McGraw-Hill International, 2015.

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**B.Tech IV-I Sem**

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**(20A27705) WASTE AND EFFLUENT MANAGEMENT**

**(OPEN ELECTIVE-IV)**

**Course Objectives:**

- To understand the wastewater treatment process.
- To gain knowledge on waste disposal in various ways.
- To know about advances in wastewater treatment.

**Course Outcomes:**

- Acquires knowledge on technologies used for chemical and biological methods of waste water and effluent treatment

**UNIT I**

Wastewater Treatment an Overview: Terminology – Regulations – Health and Environment Concerns in waste water management – Constituents in waste water inorganic – Organic and metallic constituents. Process Analysis and Selection: Components of waste water flows – Analysis of Data – Reactors used in waste water treatment – Mass Balance Analysis – Modeling of ideal and non ideal flow in Reactors – Process Selection

**UNIT II**

Waste disposal methods – Physical, Chemical & Biological; Economical aspects of waste treatment and disposal. Treatment methods of solid wastes: Biological composting, drying and incineration; Design of Solid Waste Management System: Landfill Digester, Vermicomposting Pit.

**UNIT III**

Introduction: Classification and characterization of food industrial wastes from Fruit and Vegetable processing industry, Beverage industry; Fish, Meat & Poultry industry, Sugar industry and Dairy industry.

Chemical Unit Processes: Role of unit processes in waste water treatment chemical coagulation – Chemical precipitation for improved plant performance chemical oxidation – Neutralization – Chemical Storage

**UNIT IV**

Biological Treatment: Overview of biological Treatment – Microbial metabolism – Bacterial growth and energetics – Aerobic biological oxidation – Anaerobic fermentation and oxidation – Trickling filters – Rotating biological contractors – Combined aerobic processes – Activated sludge film packing.

**UNIT V**

Advanced Wastewater Treatment: Technologies used in advanced treatment – Classification of technologies. Removal of Colloids and suspended particles – Depth Filtration – Surface Filtration – Membrane Filtration-Absorption – Ion Exchange – Advanced oxidation process.

**Textbooks:**

1. Herzka A & Booth RG; “Food Industry Wastes: Disposal and Recovery”; Applied Science Pub Ltd. 1981,
2. Fair GM, Geyer JC & Okun DA; “Water & Wastewater Engineering”; John Wiley & Sons, Inc. 1986,

**References:**

1. GE; “Symposium: Processing Agricultural & Municipal Wastes”; AVI. 1973,
2. Inglett Green JH & Kramer A; “Food Processing Waste Management”; AVI. 1979,
3. Rittmann BE & McCarty PL; “Environmental Biotechnology: Principles and Applications”; Mc-Graw-Hill International editions 2001,.
4. Bhattacharyya B C & Banerjee R; “Environmental Biotechnology”; Oxford University Press.
5. Bartlett RE; “ Wastewater Treatment; Applied Science” Pub Ltd.
6. G. Tchobanoglous, FI Biston, “Waste water Engineering Treatment and Reuse”: Mc Graw Hill, 2002.
7. “Industrial Waste Water Management Treatment and Disposal by Waste Water” 3<sup>rd</sup> Edition Mc Graw Hill 2008

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR**

**B.Tech IV-I Sem**

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**(20A54703) NUMBER THEORY AND ITS APPLICATIONS**

**(OPEN ELECTIVE-IV)**

**Course Objectives:**

This course enables the students to learn the concepts of number theory and its applications to information security.

**Course Outcomes:**

- Understand number theory and its properties.
- Understand principles on congruences
- Develop the knowledge to apply various applications
- Develop various encryption methods and its applications.

**UNIT I Integers, Greatest common divisors and prime Factorization**

The well-ordering property-Divisibility-Representation of integers-Computer operations with integers-Prime numbers-Greatest common divisors-The Euclidean algorithm -The fundamental theorem of arithmetic-Factorization of integers and the Fermat numbers-Linear Diophantine equations

**UNIT II Congruences**

Introduction to congruences -Linear congruences-The Chinese remainder theorem-Systems of linear congruences

**UNIT III Applications of Congruences**

Divisibility tests-The perpetual calendar-Round-robin tournaments-Computer file storage and hashing functions. Wilson's theorem and Fermat's little theorem- Pseudo primes- Euler's theorem- Euler's  $\phi$ -function- The sum and number of divisors- Perfect numbers and Mersenne primes.

**UNIT IV Finite fields & Primality, factoring**

Finite fields- quadratic residues and reciprocity-Pseudo primes-rho method-fermat factorization and factor bases.

**UNIT V Cryptology**

Basic terminology-complexity theorem-Character ciphers-Block ciphers-Exponentiation ciphers-Public-key cryptography-Discrete logarithm-Knapsack ciphers- RSA algorithm-Some applications to computer science.

**Textbooks:**

1. Elementary number theory and its applications, Kenneth H Rosen, AT & T Information systems & Bell laboratories.
2. A course in Number theory & Cryptography, Neal Koblitz, Springer.

**Reference Books:**

1. An Introduction To The Theory Of Numbers, Herbert S. Zuckerman, Hugh L. Montgomery, Ivan Niven, wiley publishers
2. Introduction to Analytic number theory-Tom M Apostol, springer
3. Elementary number theory, VK Krishnan, Universities press

Online Learning Resources:

<https://www.slideshare.net/ItishreeDash3/a-study-on-number-theory-and-its-applications>

## JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

B.Tech IV-I Sem

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## (20A56703) SMART MATERIALS AND DEVICES

(OPEN ELECTIVE-IV)

**Course Objectives:**

- To provide exposure to smart materials and their engineering applications.
- To impart knowledge on the basics and phenomenon behind the working of smart materials
- To enlighten the properties exhibited by smart materials
- To educate various techniques used to synthesize and characterize smart materials
- To identify the required smart material for distinct applications/devices

**Course Outcomes:**

- to recognize the need of smart materials
- to understand the working principles of smart materials
- to know different techniques used to synthesize and characterize smart materials
- to exploit the properties of smart materials
- to make use of smart materials for different applications

**UNIT I**

**Introduction:** Historical account of the discovery and development of smart materials, Two phases: Austenite and Martensite, Temperature induced phase changes, Shape memory effect, Pseudoelasticity, One-way shape memory effect, Two-way shape memory effect.

**UNIT II: Properties of Smart Materials:** Physical principles of optical, Electrical, Dielectric, Piezoelectric, Ferroelectric, Pyroelectric and Magnetic properties of smart materials

**UNIT III: Synthesis of smart materials:** Solid state reaction technique, Chemical route: Chemical vapour deposition, Sol-gel technique, Hydrothermal method, Co-precipitation. Green synthesis, Mechanical alloying and Thin film deposition techniques: Chemical etching, Sol-gel, spray pyrolysis.

**UNIT IV: Characterization techniques:** X-ray diffraction, Raman spectroscopy (RS), Fourier-transform infrared reflection (FTIR), UV-Visible spectroscopy, Scanning electron microscopy (SEM), Transmission electron microscopy, Atomic force microscopy (AFM) and Differential Scanning Calorimetry (DSC).

**UNIT V: Materials and Devices:** Characteristics of shape memory alloys, Magnetostrictive, Optoelectronic, Piezoelectric, Metamaterials, Electro-rheological and Magneto-rheological materials and Composite materials. Devices based on smart materials: Sensors & Actuators, MEMS and intelligent devices, Future scope of the smart materials.

**Textbooks:**

1. Encyclopaedia of Smart Materials- Mel Schwartz, John Wiley & Sons, Inc.2002
2. Smart Materials and Structures - M. V. Gandhi and B.S. Thompson, Chapman and Hall, 1992

**References:**

1. Smart Materials and Technologies- M. Addington and D. L. Schodek, , Elsevier, 2005.
2. Characterization and Application of smart Materials -R. Rai, Synthesis, , Nova Science, 2011.
3. Electroceramics: Materials, Properties, Applications -A.J. Moulson and J.M. Herbert, 2<sup>nd</sup>Edn., John Wiley & Sons, 2003.
4. Piezoelectric Sensorics: Force, Strain, Pressure, Acceleration and Acoustic 1. Emission Sensors, Materials and Amplifiers, G. Gautschi, Springer, 2002.
5. Optical Metamaterials: Fundamentals and Applications -W. Cai and V. Shalaev, springer,2010.
6. Smart Materials and Structures - P. L Reece, New Research, Nova Science, 2007

**NPTEL courses links**

<https://nptel.ac.in/courses/112/104/112104173/>

<https://nptel.ac.in/courses/112/104/112104251/>

[https://nptel.ac.in/content/storage2/courses/112104173/Mod\\_1\\_smart\\_mat Lec](https://nptel.ac.in/content/storage2/courses/112104173/Mod_1_smart_mat Lec)



## JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

B.Tech IV-I Sem

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**(20A51703) GREEN CHEMISTRY AND CATALYSIS FOR SUSTAINABLE ENVIRONMENT (OPEN ELECTIVE-IV)****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.

**Course Outcomes:**

- 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.

**UNIT I: 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 II: 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 III: ORGANIC SOLVENTS: ENVIRONMENTALLY BENIGN SOLUTIONS**

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 catalyst and solvent

**UNIT IV: 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 V: 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

**Textbooks:**

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, 4<sup>th</sup> Edition, Oxford University Press, USA

**References:**

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

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**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR**

**B.Tech (CSE)**

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**(20A05H01) PRIVACY PRESERVING AND DATA PUBLISHING**

**Pre-requisite**            **Probability, Design and Analysis of Algorithms**

**Course Objectives:**

Introduce attack models, provide methods and tools for publishing useful information while preserving data privacy.

**Course Outcomes:**

After completion of the course, students will be able to

- Apply anonymization methods for sensitive data protection.
- Apply state-of art techniques for data privacy protection.
- Design privacy preserving algorithms for real-world applications.
- Identify security and privacy issues in OLAP systems.
- Apply information metrics for Maximizing the preservation of information in the anonymization process.

**UNIT I**

12 Hrs

Data Collection and Data Publishing, Introduction to Privacy-Preserving Data Publishing, Attack Models and Privacy Models: Record Linkage Model, Attribute Linkage Model, Probabilistic Model, Modeling Adversary's Background Knowledge

**UNIT II**

12 Hrs

Anonymization Operations, Generalization and Suppression, Anatomization and Permutation, Random Perturbation, Information Metrics, General Purpose Metrics, Special Purpose Metrics, Trade-Off Metrics, Anonymization Algorithms: Algorithms for the Record Linkage Model, Algorithms for the Attribute Linkage Model, Algorithms for the Table Linkage Model, Algorithms for the Probabilistic Attack Model, Attacks on Anonymous Data,

**UNIT III**

12 Hrs

Anonymization for Classification Analysis: Introduction, Anonymization Problems for Red Cross BTS, High-Dimensional Top-Down Specialization (HDTDS), Workload-Aware Mondrian, Bottom-Up Generalization, Genetic Algorithm, Evaluation Methodology, Anonymization for Cluster Analysis: Introduction, Anonymization Framework for Cluster Analysis, Dimensionality Reduction-Based Transformation

12 Hrs

**UNIT IV**

Multiple Views Publishing: Introduction, Checking Violations of  $k$ -Anonymity on Multiple Views, Checking Violations with Marginals, Anonymizing Sequential Releases with New Attributes: Introduction, Monotonicity of Privacy, Anonymization Algorithm for Sequential Releases,

Anonymizing Incrementally Updated Data Records: Introduction, Continuous Data Publishing, Dynamic Data Republishing

**UNIT V**

12 Hrs

Collaborative Anonymization for Vertically Partitioned Data: Introduction, Privacy-Preserving Data Mashup, Cryptographic Approach, Collaborative Anonymization for Horizontally Partitioned Data: Introduction, Privacy Model, Overview of the Solution, Anonymizing Transaction Data: Introduction, Cohesion Approach, Band Matrix Method,  $km$ -Anonymization, Transactional  $k$ -Anonymity, Anonymizing Query Logs

**Textbooks:**

1. Benjamin C.M. Fung, Ke Wang, Ada Wai-Chee Fu and Philip S. Yu, Introduction to Privacy-Preserving Data Publishing: Concepts and Techniques, 1st Edition, Chapman & Hall/CRC, 2010.
2. Charu C. Aggarwal, Privacy-Preserving Data Mining: Models and Algorithms, 1st Edition, Springer, 2008.

**Reference Books:**

1. Chen, B. C., Kifer, D., LeFevre, K., & Machanavajjhala, A. (2009). Privacy-preserving data publishing. Foundations and Trends® in Databases, 2(1–2), 1-167.

**Online Learning Resources:**

<https://archive.nptel.ac.in/courses/106/106/106106235/>

<https://archive.nptel.ac.in/courses/106/106/106106146/>

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**(20A05H02) NoSQL DATABASES**

**Pre-requisite DBMS**

**Course Objectives:**

- Discuss the history unstructured data
- To know non-relational databases and their importance in Data science.
- Understand the differences between Relational and NoSQL databases
- To explore the several types of NoSQL databases and understand the role in Big Data.

**Course Outcomes:**

After completion of the course, students will be able to

- Explain and compare different types of NoSQL database.
- Compare and contrast RDBMS with different NoSQL databases.
- Define, compare and use the four types of NoSQL databases (Document-oriented, Key-Value pairs, Column-oriented and Graph)
- Demonstrate the architecture, define objects, load data, query data and performance tune Column-oriented, Key-Value pair, Document and Graph databases.
- Evaluate NoSQL database development tools and programming languages

**UNIT I Overview and history of NoSQL Databases**

Lecture 12Hrs

Definition of the four types of NoSQL databases. The value of Relational Databases, Getting at Persistent Data, Concurrency, Integration, Impedance Mismatch, Application and Integration Databases, Attack of the Clusters, The emergence of NoSQL, Key Points.

**UNIT II RDBMS Vs NoSQL**

Lecture 12Hrs

Comparison of relational databases to new NoSQL stores, MongoDB, Cassandra, HBASE, Neo4j use and deployment, Application, RDBMS approach, Challenges NoSQL approach, Key-Value and Document Data Models, Column-Family Stores, Aggregated-Oriented Databases, Replication and Sharding, MapReduce on databases, Distribution Models, Single Server, Sharding, Master-Slave Replication, Peer-to-Peer Replication, Combining Sharding and Replication.

**UNIT III Document Databases**

Lecture 12Hrs

No-SQL Key-Value Databases using MongoDB, Document Databases, Document oriented Database Features, Consistency, Transactions, Availability, Query Features, Scaling, Suitable Use Cases, Event Logging, Content Management Systems, Blogging Platforms, Web Analysis or Real Time Analytics.

**UNIT IV Column Oriented Databases**

Lecture 12Hrs

Column-oriented NoSQL databases using Apache HBASE, Column-oriented NoSQL databases using Apache Cassandra, Architecture of HBASE, Column-Family Data Store Features, Consistency, Transactions, Availability, Query Features, Scaling, Suitable Use Cases, Event Logging, Content

Management Systems, Blogging Platforms, Counters, Expiring Usage.

## **UNIT V Key Value Databases**

Lecture 12Hrs

NoSQL Key-Value databases using Riak, Key-Value Databases, Key-Value Store, Key-Value Store Features, Consistency, Transactions, Query Features, Consistency, Transactions, Query Features, Structure of Data, Scaling, Suitable Use Cases, Storing Session Information, User Profiles, Preferences, Shopping Cart Data, Relationships among Data, Multi operation Transactions, Query by Data, Operations by Sets, Firebase- Cloud hosted NoSQL Database, Graph NoSQL databases using Neo4j, NoSQL database development tools and programming languages, Graph Databases features, consistency, Transactions, Availability, Query Features, Scaling, Suitable Use Cases.

### **Textbooks:**

1. Sadalage, P. & Fowler, NoSQL Distilled: A Brief Guide to the Emerging World of Polyglot Persistence, Wiley Publications, 1<sup>st</sup> Edition 2019.

### **Reference Books:**

1. Redmond, E. & Wilson, J. (2012). Seven Databases in Seven Weeks: A Guide to Modern Databases and the NoSQL Movement (1st Ed.). Raleigh, NC: The Pragmatic Programmers, LLC. ISBN-13: 978-1934356920 ISBN-10: 1934356921
2. Guy Harrison, Next Generation Database: NoSQL and big data, Apress.

### **Online Learning Resources:**

1. <https://www.ibm.com/cloud/learn/nosql-databases>
2. <https://www.coursera.org/lecture/nosql-databases/introduction-to-nosql-VdRNp>
3. <https://www.geeksforgeeks.org/introduction-to-nosql/>
4. <https://www.javatpoint.com/nosql-databa>

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR**

**B.Tech (CSE)**

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**(20A05H03) SOFTWARE DEFINED DATA CENTER**

**Course Objectives:**

- Introduce conventional Data Centers followed by Modern Data Centers
- To discuss various software elements of modern data centers
- Explain Virtualization concepts for Data Centers
- Discuss Compute, Storage and Network virtualization

**Course Outcomes:**

After completion of the course, students will be able to

- Understanding of difference between Conventional Data Center Vs Modern Data Centers
- Differentiate Cloud computing and Software Defined Data Centers
- Differentiate Virtualization with conventional techniques
- Explore the techniques of Software Defined Compute, Storage and Networking components
- Able Manage Software Defined Data Centers and Develop the techniques for future Data Centers.

**UNIT I Introduction**

Lecture 12Hrs

Data Center evolution, A history of Modern Data Center, Focus on cost reduction, Focus on Customer service in the business, Flattening of the IT organization, IT as an operational Expense, Monolithic Storage Array rise and fall, Move From Disk to Flash, Emergence of Convergence, The Role of Cloud computing.

**UNIT II Emerging Data Center Trends**

Lecture 12Hrs

Emergence of SDCC, Commoditization of Hardware, Software Defined – Compute, Storage, Networking and Security, Software Defined Storage (SDS), Hyperconvergence, Hyper Converged Infrastructure(HCI) and SDS relationship, Flash in Hyperconvergence, Modern IT business Requirements.

**UNIT III Data Center Agility**

Lecture 12Hrs

Principles and Strategies, Transform Data Center, Align Data Center and Business Needs, Server virtualization, VDI, Eliminate and Implement Monolithic to Hyperconvergence, Full Stack Management.

**UNIT V Hyper converged Infrastructure**

Lecture 12Hrs

Software Defined Storage, SDS comparison to Traditional Storage, SDS requirements, SDS in Hyperconverged, Hyperconvergence Design Model, Virtual Storage appliances, Appliance vs.





**Robot Arm Kinematics and Dynamics:** Introduction to Kinematics, Direct and Inverse Kinematics Problem and solution, Dynamics introduction, Lagrange-Euler Formulation, Newton Euler Formulation, Generalized D'Alembert Equations of motion. Trajectory planning,

### UNIT III

Lecture 9Hrs

**Sensing and Vision:** Introduction to Sensing, Proximity Sensing, Touch Sensors, Force and Torque Sensing, Image acquisition, Illumination techniques, Imaging Geometry, Recognition and Interpretation.

### UNIT IV

Lecture 8Hrs

**Robot Programming Languages:** Introduction to Robot Programming Languages, Characteristics of Robot Level Languages, three levels of robot programming, requirements of a robot programming language, Task Level Languages, problems peculiar to robot languages, Introduction to Robot Operating System (ROS)

### UNIT V

Lecture 8Hrs

**Robot Intelligence:** Introduction, State Space Search, Problem Reduction, Use of Predicate Logic, Means-Ends Analysis, Problem solving, Robot Learning, Robot Task Planning, Basic Problems in Task Planning, Expert systems and knowledge engineering.

#### Textbooks:

1. K.S. Fu, R.C. Gonzalez, C.S.G. Lee, Robotics : Control, Sensing, Vision and Intelligence
2. Aaron Martinez, Enrique Fernandez, Learning ROS for Robotics Programming: A practical, instructive, and comprehensive guide to introduce yourself to ROS, the top-notch, leading robotics framework, PACKT publishing, Open Source.

#### Reference Books:

John J. Craig, Introduction to Robotics: Mechanics and Control, Addison Wesley publication, Third Edition.

#### Online Learning Resources

<https://nptel.ac.in/courses/107106090>

<https://nptel.ac.in/courses/112108298>