Academic Regulations-M.Tech. 2009-10

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR
Academic Regulations For The Award Of Full Time M.Tech. P.G. Degree
(WITH EFFECT FROM THE ACADEMIC YEAR 2009-10)

The Jawaharlal Nehru Technological University Anantapur shall confer M.Tech. Post Graduate degree to candidates who are admitted to the Master of Technology Programs and fulfill all the requirements for the award of the degree.

1.0 ELIGIBILITY FOR ADMISSIONS:

Admission to the above programme shall be made subject to the eligibility, qualifications and specialization prescribed by the University for each programme, from time to time.

Admissions shall be made either on the basis of merit rank obtained by the qualified candidates at an Entrance Test conducted by the University or on the basis of GATE / PGECET score, subject to reservations prescribed by the University or Government policies from time to time.

2.0 **COURSE WORK:**

2.1 A Candidate after securing admission must pursue the M.Tech. course of study for Four semesters duration.

2.2 Each semester shall be of 20 weeks duration including all examinations.

2.3 A candidate admitted to a programme should complete it within a period equal to twice the prescribed duration of the programme from the date of admission.

3.0 ATTENDANCE:

3.1 A candidate shall be deemed to have eligibility to write end semester examinations if he has put in at least 75% of attendance on cumulative basis of all subjects/courses in the semester.

3.2 Condonation of shortage of attendance up to 10% i.e., from 65% and above and less than 75% may be given by the college on the recommendation of the Principal.

3.3 Condonation of shortage of attendance shall be granted only on genuine and valid reasons on representation by the candidate with supporting evidence.

3.4 If the candidate does not satisfy the attendance requirement he is detained for want of attendance and shall reregister for that semester. He / she shall not be promoted to the next semester.

4.0. EVALUATION:

The performance of the candidate in each semester shall be evaluated subject wise, with a maximum of 100 marks for Theory and 100 marks for practicals, on the basis of Internal Evaluation and End Semester Examination.

4.1 For the theory subjects 60% of the marks will be for the External End Examination. While 40% of the marks will be for Internal Evaluation, based on the better of the marks secured in the two Mid Term-Examinations held, one in the middle of the Semester (I-IV units) and another immediately after the completion of instruction (V-VIII) units with Three questions to be answered out of four in 2hours, evaluated* for 40 marks.

*****Note: All the Questions shall be of equal weightage of 10 marks and the marks obtained for 3questions shall be extrapolated to 40 marks, any fraction rounded off to the next higher mark

4.2 For practical subjects, 60 marks shall be for the End Semester Examinations and 40 marks will be for internal evaluation based on the day to day performance.

4.3 For Seminar there will be an internal evaluation of 50 marks. A candidate has to secure a minimum of 50% to be declared successful. The assessment will be made by a board consisting of HOD and two internal experts at the end of IV semester instruction.

4.4 A candidate shall be deemed to have secured the minimum academic requirement in a subject if he secures a minimum of 40% of marks in the End Examination and a minimum aggregate of 50% of the total marks in the End Semester Examination and Internal Evaluation taken together.

4.5 In case the candidate does not secure the minimum academic requirement in any of the subjects (as specified in 4.4.) he has to reappear for the Semester Examination either supplementary or regular in that subject, or repeat the course when next offered or do any other specified subject as may be required.

5.0 RE-REGISTRATION FOR IMPROVEMENT OF INTERNAL EVALUATION MARKS:

Following are the conditions to avail the benefit of improvement of internal evaluation marks.

5.1 The candidate should have completed the course work and obtained examinations results for I & II semesters.

5.2 He should have passed all the subjects for which the Internal evaluation marks secured are more than 50%.

5.3 Out of the subjects the candidate has failed in the examination due to Internal evaluation marks secured being less than 50%, the candidate shall be given one chance for each Theory subject and for a maximum of **three** Theory subjects for Improvement of Internal evaluation marks.

5.4 The candidate has to re-register for the chosen subjects and fulfill the academic requirements.

5.5 For each subject, the candidate has to pay a fee equivalent to one third of the semester tuition fee and the amount is to be remitted in the form of D.D. in favour of the

Registrar, JNTUA payable at Anantapur along with the requisition through the Principal of the respective college.

5.6 In the event of availing the Improvement of Internal evaluation marks, the internal evaluation marks as well as the End Examinations marks secured in the previous attempt(s) for the reregistered subjects stand cancelled.

6.0 EVALUATION OF PROJECT WORK:

Every candidate shall be required to submit thesis or dissertation after taking up a topic approved by the college/ institute.

6.1 Registration of Project work: A candidate is permitted to register for the project work after satisfying the attendance requirement of all the courses (theory and practical courses of I & II Sem)

6.2 An Internal Departmental Committee (I.D.C) consisting of HOD, Supervisor and one internal senior expert shall monitor the progress of the project work.

6.3 The work on the project shall be initiated in the penultimate semester and continued in the final semester. The duration of the project is for two semesters. The candidate can submit Project thesis with the approval of I.D.C. after 36 weeks from the date of registration at the earliest and one calendar year from the date of registration for the project work. Extension of time within the total permissible limit for completing the programme is to be obtained from the Head of the Institution.

6.4 The student must submit status report at least in three different phases during the project work period. These reports must be approved by the I.D.C before submission of the Project Report.

6.5 A candidate shall be allowed to submit the thesis / dissertation only after passing in all the prescribed subjects (both theory and practical) and then take viva voce examination of the project. The viva-voce examination may be conducted once in two months for all the candidates submitted during that period.

6.6 Three copies of the Thesis / Dissertation certified in the prescribed from by the supervisor & HOD shall be presented to the H.OD. One copy is to be forwarded to the University and one copy to be sent to the examiner.

6.7 The college shall submit a panel of three experts for a maximum of 5 students at a time. However, the thesis / dissertation will be adjudicated by one examiner nominated by the University.

6.8 If the report of the examiner is favorable viva-voce examination shall be conducted by a board consisting of the Supervisor, Head of the Department and the examiner who adjudicated the thesis / dissertation. The board shall jointly report candidates work as:

1.	Very Good	Grade A
2.	Good	Grade B
3.	Satisfactory	Grade C
4.	Not satisfactory	Grade D

If the report of the viva-voce is not satisfactory (Grade D) the candidate will retake the viva-voce examination after three months. If he fails to get a satisfactory report at the second viva-voce examination he will not be eligible for the award of the degree unless the candidate is permitted to revise and resubmit the thesis.

7.0 AWARD OF DEGREE AND CLASS:

A candidate shall be eligible for the award of respective degree if he satisfies the minimum academic requirements in every subject and secures 'satisfactory' or higher grade report on his thesis/dissertation and viva-voce. Based on overall percentage of marks obtained, the following class is awarded.

First class with Distinction:	70% or more
First class	below 70% but not less than 60%
Second class	below 60% but not less than 50%

8.0 WITH – HOLDING OF RESULTS:

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

9.0 TRANSITORY REGULATIONS:

Candidates who have discontinued or have been detained for want of attendance or who have failed after having undergone the course in earlier regulations and wish to continue the course are eligible for admission into the unfinished semester from the date of commencement of class work with the same or equivalent subjects as and when subjects are offered, subject to 4.5 and 2.3 sections. Whereas they continue to be in the academic regulations they were first admitted.

10.0 GENERAL:

i. **The academic regulations should be read as a whole for purpose of any interpretation**.
ii. **Disciplinary action for Malpractice / improper conduct in examinations is appended**.
iii. **There shall be no places transfer within the constituent colleges and affiliated colleges of Jawaharlal Nehru Technological University Anantapur.**
iv. **Where the words "he", "him", "his", occur in the regulations, they include "she", "her", "hers".**
v. **In the case of any doubt or ambiguity in the interpretation of the above rules, the decision of the Vice-Chancellor is final.**
vi. **The University may change or amend the academic regulations or syllabi at any time and the changes or amendments shall be made applicable to all the students on rolls with effect from the dates notified by the University.**

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RULES FOR DISCIPLINARY ACTION FOR MALPRACTICE / IMPROPER CONDUCT IN EXAMINATIONS

	Nature of Malpractices/Improper conduct	Punishment
	If the candidate	
1. (a)	Possesses or keeps accessible in examination hall, any paper, note book, programmable calculators, Cell phones, pager, palm computers or any other form of material concerned with or related to the subject of the examination (theory or practical) in which he is appearing but has not made use of (material shall include any marks on the body of the candidate which can be used as an aid in the subject of the examination)	Expulsion from the examination hall and cancellation of the performance in that subject only.
(b)	Gives assistance or guidance or receives it from any other candidate orally or by any other body language methods or communicates through cell phones with any candidate or persons in or outside the exam hall in respect of any matter.	Expulsion from the examination hall and cancellation of the performance in that subject only of all the candidates involved. In case of an outsider, he will be handed over to the police and a case is registered against him.
2.	Has copied in the examination hall from any paper, book, programmable calculators, palm computers or any other form of material relevant to the subject of the examination (theory or practical) in which the candidate is appearing.	Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted to appear for the remaining examinations of the subjects of that Semester/year. The Hall Ticket of the candidate is to be cancelled and sent to the University.
3.	Comes in a drunken condition to the examination hall.	Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year.

4.	Smuggles in the Answer book or additional sheet or takes out or arranges to send out the question paper during the examination or answer book or additional sheet, during or after the examination.	Expulsion from the examination hall and cancellation of performance in that subject and all the other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred for two consecutive semesters from class work and all University examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat.
5.	Leaves the exam hall taking away answer script or intentionally tears of the script or any part thereof inside or outside the examination hall.	Expulsion from the examination hall and cancellation of performance in that subject and all the other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred for two consecutive semesters from class work and all University examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat.
6.	Possess any lethal weapon or firearm in the examination hall.	Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred and forfeits the seat.

7.	Impersonates any other candidate in connection with the examination.	The candidate who has impersonated shall be expelled from examination hall. The candidate is also debarred and forfeits the seat. The performance of the original candidate who has been impersonated, shall be cancelled in all the subjects of the examination (including practicals and project work) already appeared and shall not be allowed to appear for examinations of the remaining subjects of that semester/year. The candidate is also debarred for two consecutive semesters from class work and all University examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat. If the impostor is an outsider, he will be handed over to the police and a case is registered against him.
8.	Refuses to obey the orders of the Chief Superintendent/Assistant – Superintendent / any officer on duty or misbehaves or creates disturbance of any kind in and around the examination hall or organizes a walk out or instigates others to walk out, or threatens the officer-in charge or any person on duty in or outside the examination hall of any injury to his person or to any of his relations whether by words, either spoken or written or by signs or by visible representation, assaults the officer-in-charge, or any person on duty in or outside the examination hall or any of his relations, or indulges in any other act of misconduct or mischief which result in damage to or destruction of property in the examination hall or any part of the College campus or engages in any other act which in the opinion of the officer on duty amounts to use of unfair means or misconduct or has the tendency to disrupt the orderly conduct of the examination.	In case of students of the college, they shall be expelled from examination halls and cancellation of their performance in that subject and all other subjects the candidate(s) has (have) already appeared and shall not be permitted to appear for the remaining examinations of the subjects of that semester/year. The candidates also are debarred and forfeit their seats. In case of outsiders, they will be handed over to the police and a police case is registered against them.

9.	If student of the college, who is not a candidate for the particular examination or any person not connected with the college indulges in any malpractice or improper conduct mentioned in clause 6 to 8.	Student of the colleges expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred and forfeits the seat. Person(s) who do not belong to the College will be handed over to police and, a police case will be registered against them.
10.	Uses objectionable, abusive or offensive language in the answer paper or in letters to the examiners or writes to the examiner requesting him to award pass marks.	Cancellation of the performance in that subject.
11.	Copying detected on the basis of internal evidence, such as, during valuation or during special scrutiny.	Cancellation of the performance in that subject and all other subjects the candidate has appeared including practical examinations and project work of that semester/year examinations.
12.	If any malpractice is detected which is not covered in the above clauses 1 to 11 shall be reported to the University for further action to award suitable punishment.	

Malpractices identified by squad or special invigilators

1. Punishments to the candidates as per the above guidelines.
2. Punishment for institutions : (if the squad reports that the college is also involved in encouraging malpractices)
   (i) A show cause notice shall be issued to the college.
   (ii) Impose a suitable fine on the college.
   (iii) Shifting the examination centre from the college to another college for a specific period of not less than one year.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR
Course Structure and syllabi for

M.Tech. DIGITAL ELECTRONICS AND COMMUNICATION SYSTEMS (DECS)

for affiliated Engineering Colleges2009-10

I YEAR I SEMESTER

S. No	Course code	Subject	Theory	Lab.	Credits
1.	9D06101	Digital System Design	4		4
2.	9D06102	Embedded System Concepts	4		4
3.	9D38103	Advanced Digital Signal Processing	4		4
4.	9D38104	Digital Communication Techniques	4		4
5.	9D38105	Adaptive Signal Processing	4		4
6.	9D06103a 9D06106b 9D06106c	**ELECTIVE I** a. Advanced Computer Architectures b. DSP Processors & Architectures c. Low Power VLSI Design	4		4
7.	9D06107	Digital System Design Lab		3	2
		contact periods/week	24	3	26
			Total 27		

I YEAR II SEMESTER

S. No	Course code	Subject	Theory	Lab.	Credits
1.	9D06201	Micro Computer System Design	4		4
2.	9D06202	Hi-Speed Networks	4		4
3.	9D38203	Wireless Communications	4		4
4.	9D38204	Coding Theory & Techniques	4		4
5.	9D38205	Detection & Estimation of Signals	4		4
6.	9D06205a 9D38206b 9D38206c	**ELECTIVE II** a. Image & Video Processing b. Optical Communications c. Compression Techniques	4		4
7.	9D38207	Communications & Signal Processing Lab		3	2
		contact periods/week	24	3	26
			Total 27		

II YEAR (III & IV Semesters)

S. No	Course code	Subject		credits
1	9D38401	Seminar		2
2	9D38402	Project work		16

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

M.Tech. I SEMESTER (DECS) **Th 4** **C 4**

(9D06101) DIGITAL SYSTEM DESIGN

UNIT I: DESIGN OF DIGITAL SYSTEMS: ASM charts, Hardware description language and control sequence method, Reduction of state tables, state assignments.

UNIT II: SEQUENTIAL CIRCUIT DESIGN: design of Iterative circuits, design of sequential circuits using ROMs and PLAs, sequential circuit design using CPLD, FPGAs.

UNIT III: FAULT MODELING: Fault classes and models – Stuck at faults, bridging faults, transition and intermittent faults.
TEST GENERATION: Fault diagnosis of Combinational circuits by conventional methods – Path Sensitization technique, Boolean difference method, Kohavi algorithm.

UNIT IV: TEST PATTERN GENERATION: D – algorithm, PODEM, Random testing, transition count testing, Signature Analysis and testing for bridging faults.

UNIT V: FAULT DIAGNOSIS IN SEQUENTIAL CIRCUITS: State identification and fault detection experiment. Machine identification, Design of fault detection experiment.

UNIT VI: PROGRAMMING LOGIC ARRAYS: Design using PLA's, PLA minimization and PLA folding.

UNIT VII:PLA TESTING: Fault models, Test generation and Testable PLA design.

UNIT VIII: ASYNCHRONOUS SEQUENTIAL MACHINE: fundamental mode model, flow table, state reduction, minimal closed covers, races, cycles and hazards.

TEXTBOOKS:
1. "Switching & finite Automata Theory" Z. Kohavi , (TMH)
2. "Logic Design Theory" N. N. Biswas,– (PHI)
3. "Digital Logic Design Principles", Nolman Balabanian, Bradley Calson Wily Student Edition 2004.

REFRENCES:
1. M. Abramovici, M. A. Breues, A. D. Friedman – "Digital System Testing and Testable Design", Jaico Publications
2. Charles H. Roth Jr. – "Fundamentals of Logic Design".
3. Frederick. J. Hill & Peterson – "Computer Aided Logic Design" – Wiley 4^{th} Edition.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

M.Tech. I SEMESTER (DECS) **Th 4** **C 4**

(9D06102) EMBEDDED SYSTEM CONCEPTS

UNIT I:INTRODUCTION: Embedded system overview, embedded hardware units, embedded software in a system, embedded system on chip (SOC), design process, classification of embedded systems

UNIT II: EMBEDDED COMPUTING PLATFORM: CPU Bus, memory devices, component interfacing, networks for embedded systems, communication interfacings: RS232/UART, RS422/RS485, IEEE 488 bus.

UNIT III: SURVEY OF SOFTWARE ARCHITECTURE: Round robin, round robin with interrupts, function queue scheduling architecture, selecting an architecture saving memory space

UNIT IV: EMBEDDED SOFTWARE DEVELOPMENT TOOLS: Host and target machines, linkers, locations for embedded software, getting embedded software into target system, debugging technique

UNIT V: RTOS CONCEPTS: Architecture of the kernel, interrupt service routines, semaphores, message queues, pipes.

UNIT VI: INSTRUCTION SETS: Introduction, preliminaries, ARM processor, SHARC processor.

UNIT VII: SYSTEM DESIGN TECHNIQUES: Design methodologies, requirement analysis, specifications, system analysis and architecture design

UNIT VIII: DESIGN EXAMPLES: Telephone PBX, ink jet printer, water tank monitoring system, GPRS, Personal Digital Assistants, Set Top boxes.

TEXT BOOKS:

1. Computers as a component: principles of embedded computing system design- wayne wolf
2. An embedded software premier: David E. Simon
3. Embedded / real time systems-KVKK Prasad, Dreamtech press, 2005

REFERENCES:

1. Embedded real time systems programming-sri ram V Iyer, pankaj gupta, TMH, 2004
2. Embedded system design- A unified hardware/software introduction- frank vahid, tony D.Givargis, John Willey, 2002

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

M.Tech. I SEMESTER (DECS) **Th 4** **C 4**

(9D38103) ADVANCED DIGITAL SIGNAL PROCESSING

UNIT I

OVERVIEW : Discrete-Time Signals, Sequences and sequence Representation, Discrete-Time Systems, Time-Domain Characterization and Classification of LTI Discrete-Time Systems. The Continuous-Time Fourier Transform, The discrete-Time Fourier Transform, energy Density Spectrum of a Discrete-Time Sequence, Band-Limited Discrete-Time signals, The Frequency Response of LTI Discrete-Time System.

UNIT II

LTI DISCRETE-TIME SYSTEMS IN THE TRANSFORM DOMAIN: Types of Linear-Phase transfer functions, Simple Digital Filters, Complementary Transfer Function, Inverse Systems, System Identification, Digital Two-Pairs, Algebraic Stability Test.

UNIT III

DIGITAL FILTER SRTUCTURE AND DESIGN: All Pass Filters, Tunable IIR Digital Filter, IIR Tapped Cascade Lattice Structures, FIR Cascaded Lattice Structures, Parallel All Pass Realization of IIR Transfer Functions, State Space Structures, Polyphase Structures, Digital Sine-Cosine Generator, Computational Complexity of Digital Filter Structures, Design of IIR Filter using pade' approximation, Least Square Design Methods, Design of Computationally Efficient FIR Filters.

UNIT IV

DSP ALGORITHEMS: Fast DFT algorithms based on Index mapping, Sliding Discrete Fourier Transform, DFT Computation Over a narrow Frequency Band, Split Radix FFT, Linear filtering approach to Computation of DFT using Chirp Z-Transform.

UNIT V

MULTI RATE SIGNAL PROCESSING: Decimation by a factor D, Interpolation by a factor I, Sampling rate conversion by a rational factor I/D, Filter design & Implementation for sampling rate conversion.

UNIT VI

POWER SPECTRAL ESTIMATION: Estimation of spectra from finite duration observation of signals, Non-parametric methods: Bartlett, Welch & Blackmann & Tukey methods.
PARAMETRIC METHODS FOR POWER SPECTRUM ESTIMATION: Relation between auto correlation & model parameters, Yule-Waker & Burg Methods, MA & ARMA models for power spectrum estimation.

UNIT VII

ANALYSIS OF FINITE WORDLENGTH EFFECTS IN FIXED-POINT DSP SYSTEMS: Fixed, Floating Point Arithmetic – ADC quantization noise & signal quality-Finite word length effect in IIR digital Filters – Finite word-length effects in FFT algorithms.

UNIT VIII

APPLICATIONS OF DIGITAL SIGNAL PROCESSING: Dual Tone Multi-frequency Signal Detection, Spectral Analysis of Sinusoidal Signals, Spectral Analysis of Non stationary Signals, Musial Sound Processing, Over Sampling A/D Converter, Over Sampling D/A Converter, Discrete-Time Analytic Signal Generation.

TEXTBOOKS:

1. Digital Signal Processing by Sanjit K Mitra, Tata MCgraw Hill Publications.
2. Digital Signal Processing Principles, Algorithms, Applications by J G Proakis, D G Manolokis, PHI.

REFERENCES:

1. Discrete-Time Signal Processing by A V Oppenhiem, R W Schafer, Pearson Education.
2. DSP- A Practical Approach- Emmanuel C Ifeacher Barrie. W. Jervis, Pearson Education.
3. Modern spectral Estimation techniques by S. M .Kay, PHI, 1997

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

M.Tech. I SEMESTER (DECS)	**Th**	**C**
	4	**4**

(9D38104) DIGITAL COMMUNICATION TECHNIQUES

UNIT I

REVIEW OF RANDOM VARIABLES AND PROCESSES: Random variable – Moment generating function – Markov's inequality – Chebyshev's inequality – Central limit theorem – Chi square, Rayleigh, and Ricean distributions – Correlation – Covariance matrix – Stationary processes – Wide sense stationary processes – Ergodic process – Cross correlation – Autocorrelation functions – Gaussian process.

UNIT II

CHARACTERIZATION OF COMMUNICATION SIGNALS AND SYSTEMS: Signal space representations- Vector Space Concepts, Signal Space Concepts, Orthogonal Expansion of Signals. Representation of Digitally Modulated Signals-Memory less Modulation Methods.

UNIT III

COMMUNICATION OVER ADDITIVE GAUSSIAN NOISE CHANNELS - I: Optimum waveform Receiver in additive white Gaussian noise (AWGN) channels,Cross correlation receiver, Matched Filter receiver and error probabilities.

UNIT IV

COMMUNICATION OVER ADDITIVE GAUSSIAN NOISE CHANNELS - II: Optimum receiver for signals with random phase in AWGN channels, Optimum receiver for binary signals, Optimum receiver for M-ary orthogonal signals, Probability of error for envelope detection of M-ary orthogonal signals. Optimum waveform receiver for colored Gaussian noise channels, Karhunen Loeve expansion approach, whitening.

UNIT V

FADING CHANNELS: Characterization of fading multipath channels, Statistical Models for fading channels, Time varying Channel impulse response, narrow and wide band fading models, channel correlation functions, Key multipath parameters, Rayleigh and Ricean fading channels, Simulation methodology of fading channels.

UNIT VI

DIGITAL COMMUNICATION OVER FADING CHANNELS: Optimum coherent and non-coherent receiver in random amplitude, random phase channels- Performance of Rayleigh and Ricean channels, Performance of digital Modulation schemes such as BPSK, QPSK, FSK, DPSK, MSK etc. over wireless channels.

UNIT VII

COMMUNICATION OVER BAND LIMITED CHANNELS: Communication over band limited Channels- Optimum pulse shaping- Nyquist criterion for zero ISI, partial response

signaling- Equalization Techniques,Zero forcing linear Equalization- Decision feedback equalization.

UNIT VIII

ORTHOGONAL FREQUENCY DIVISION MULTIPLEXING (OFDM): Carrier Synchronization, Timing synchronization, Multichannel and Multicarrier Systems.

TEXT BOOKS:

1. Digital Communications, J. Proakis, McGraw Hill, 2000
2. Principles of Digital Communications and Coding, J. Viterbi and J. K. Omura, McGraw Hill, 1979
3. Spread Spectrum Communications, Marvin K. Simon, Jim K Omura, Robert A. Scholtz, Barry K.Levit,1995.
4. CDMA Principles of Spread Spectrum Communications, Andrew J Viterbi, Addison Wesley, 1995.

REFERENCES:

1. "Multi-carrier Digital Communications: Theory and Applications of OFDM." ,Ahmad R S Bahai ,Burton R Saltzberg ,Mustafa Ergen, Springer Publications.
2. J.S.Chitode, "Digital Communication", Technical Publications.
3. Edward. A. Lee and David. G. Messerschmitt, "Digital Communication",2/e, Allied Publishers.
4. J Marvin.K.Simon, Sami. M. Hinedi and William. C. Lindsey, "Digital Communication Techniques", PHI.
5. William Feller, "An introduction to Probability Theory and its applications", Vol 11, Wiley 2000.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

M.Tech. I SEMESTER (DECS)	**Th**	**C**
	4	**4**

(9D38105) ADAPTIVE SIGNAL PROCESSING

UNIT I : EIGEN ANALYSIS: Eigen Value Problem, Properties of eigen values and eigen vectors, Eigen Filters, eigen Value computations.

UNIT II: INTRODUCTION TO ADAPTIVE SYSTEMS: Definitions, Characteristics, Applications, Example of an Adaptive System. The Adaptive Linear Combiner - Description, Weight Vectors, Desired Response Performance function, Gradient & Mean Square Error.

UNIT III : DEVELOPMENT OF ADAPTIVE FILTER THEORY & SEARCHING THE PERFORMANCE SURFACE: Introduction to Filtering, Smoothing and Prediction, Linear Optimum Filtering, Problem statement, Principle of Orthogonality - Minimum Mean Square Error, Wiener- Hopf equations, Error Performance - Minimum Mean Square Error.
SEARCHING THE PERFORMANCE SURFACE – Methods & Ideas of Gradient Search methods, Gradient Searching Algorithm & its Solution, Stability & Rate of convergence - Learning Curves.

UNIT IV : STEEPEST DESCENT ALGORITHMS: Gradient Search by Newton's Method, Method of Steepest Descent, Comparison of Learning Curves.

UNIT V : LMS ALGORITHM & APPLICATIONS: Overview - LMS Adaptation algorithms, Stability & Performance analysis of LMS Algorithms - LMS Gradient & Stochastic algorithms, Convergence of LMS algorithm.
Applications: Noise cancellation, Cancellation of Echoes in long distance telephone circuits, Adaptive Beam forming.

UNIT-VI: RLS ALGORITHM: Matrix Inversion lemma, Exponentially weighted recursive least square algorithm, update recursion for the sum of weighted error squares, convergence analysis of RLS Algorithm, Application of RLS algorithm on Adaptive Equalization

UNIT VII : KALMAN FILTERING: Introduction, Recursive Mean Square Estimation Random variables, Statement of Kalman filtering problem, Filtering, Initial conditions, Variants of Kalman filtering, Extend Kalman filtering.

UNIT VIII : NON LINEAR ADAPTIVE FILTERING: Theoretical and Practical considerations of Blind Deconvolution, Buss Gang Algorithm for blind Equalization of real base band Channels.

TEXT BOOKS:

1. Adaptive Signal Processing - Bernard Widrow, Samuel D.Strearns, 2005, PE.
2. Adaptive Filter Theory - Simon Haykin-, 4 ed., 2002,PE Asia.

REFERENCES:

1. Optimum signal processing: An introduction - Sophocles.J.Orfamadis, 2 ed., 1988, McGraw-Hill, Newyork
2. Adaptive signal processing-Theory and Applications, S.Thomas Alexander, 1986, Springer – Verlag.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

M.Tech. I SEMESTER (DECS) **Th C**
4 4

ELECTIVE I
(9D06103a) ADVANCED COMPUTER ARCHITECTURE

UNIT I: FUNDAMENTALS OF COMPUTER DESIGN: Technology trends, cost- measuring and reporting performance quantitative principles of computer design.

UNIT II: INSTRUCTION SET PRINCIPLES AND EXAMPLES: classifying instruction set- memory addressing- type and size of operands- addressing modes for signal processing- operations in the instruction set, instructions for control flow, encoding an instruction set, the role of compiler

UNIT III: INSTRUCTION LEVEL PARALLELISM (ILP): over coming data hazards- reducing branch costs, high performance instruction delivery, hardware based speculation, limitation of ILP

UNIT IV: ILP SOFTWARE APPROACH: compiler techniques- static branch protection, VLIW approach, H.W support for more ILP at compile time- H.W verses S.W solutions

UNIT V: MEMORY HIERARCHY DESIGN: cache performance, reducing cache misses penalty and miss rate, virtual memory, protection and examples of VM.

UNIT VI: MULTIPROCESSORS AND THREAD LEVEL PARALLELISM: symmetric shared memory architectures, distributed shared memory, Synchronization, multi threading.

UNIT VII: STORAGE SYSTEMS- Types, Buses, RAID, errors and failures, bench marking a storage device, designing a I/O system.

UNIT VIII: INTER CONNECTION NETWORKS AND CLUSTERS: interconnection network media, practical issues in interconnecting networks- examples, clusters, designing a cluster

TEXT BOOKS:

1. Computer Architecture A quantitative approach 3rd edition John L. Hennessy & David A. Patterson Morgan Kufmann (An Imprint of Elsevier)

REFERENCES:

1. Kai Hwang and A.Briggs "Computer Architecture and parallel processing", International Edition McGraw-Hill.
2. Dezso Sima, Terence Fountain, Peter Kacsuk, "Advanced Computer Architectures", Pearson.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

M.Tech. I SEMESTER (DECS) **Th 4** **C 4**

ELECTIVE I

(9D06106b) DSP PROCESSORS & ARCHITECTURES

UNIT I: INTRODUCTION TO DIGITAL SIGNAL PROCESING: Introduction, A Digital signal-processing system, The sampling process, Discrete time sequences. Discrete Fourier Transform (DFT) and Fast Fourier Transform (FFT), Linear time-invariant systems, Digital filters, Decimation and interpolation, Analysis and Design tool for DSP Systems MATLAB, DSP using MATLAB.

UNIT II: COMPUTATIONAL ACCURACY IN DSP IMPLEMENTATIONS: Number formats for signals and coefficients in DSP systems, Dynamic Range and Precision, Sources of error in DSP implementations, A/D Conversion errors, DSP Computational errors, D/A Conversion Errors, Compensating filter.

UNIT III: ARCHITECTURES FOR PROGRAMMABLE DSP DEVICES: Basic Architectural features, DSP Computational Building Blocks, Bus Architecture and Memory, Data Addressing Capabilities, Address Generation Unit, Programmability and Program Execution, Speed Issues, Features for External interfacing.

UNIT IV : EXECUTION CONTROL AND PIPELINING: Hardware looping, Interrupts, Stacks, Relative Branch support, Pipelining and Performance, Pipeline Depth, Interlocking, Branching effects, Interrupt effects, Pipeline Programming models.

UNIT V: PROGRAMMABLE DIGITAL SIGNAL PROCESSORS: Commercial Digital signal-processing Devices, Data Addressing modes of TMS320C54XX DSPs, Data Addressing modes of TMS320C54XX Processors, Memory space of TMS320C54XX Processors, Program Control, TMS320C54XX instructions and Programming, On-Chip Peripherals, Interrupts of TMS320C54XX Processors, Pipeline Operation of TMS320C54XX Processors.

UNIT VI: IMPLEMENTATIONS OF BASIC DSP ALGORITHMS: The Q-notation, FIR Filters, IIR Filters, Interpolation Filters, Decimation Filters, PID Controller, Adaptive Filters, 2-D Signal Processing.

UNIT VII: IMPLEMENTATION OF FFT ALGORITHMS: An FFT Algorithm for DFT Computation, A Butterfly Computation, Overflow and scaling, Bit-Reversed index generation, An 8-Point FFT implementation on the TMS320C54XX, Computation of the signal spectrum.

UNIT VIII:
INTERFACING MEMORY AND I/O PERIPHERALS TO PROGRAMMABLE DSP DEVICES: Memory space organization, External bus interfacing signals, Memory interface, Parallel I/O interface, Programmed I/O, Interrupts and I/O, Direct memory access (DMA). A Multichannel buffered serial port (McBSP), McBSP Programming, a CODEC interface circuit, CODEC programming, A CODEC-DSP interface example.

TEXT BOOKS:
1. Digital Signal Processing – Avtar Singh and S. Srinivasan, Thomson Publications, 2004.
2. DSP Processor Fundamentals, Architectures & Features – Lapsley et al.S. Chand & Co, 2000.

REFERENCES:
1. Digital Signal Processors, Architecture, Programming and Applications-B.Venkata Ramani and M. Bhaskar, TMH, 2004.
2. Digital Signal Processing – Jonatham Stein, John Wiley, 2005.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

M.Tech. I SEMESTER (DECS) **Th 4** **C 4**

ELECTIVE I
(9D06106c) LOW POWER VLSI DESIGN

UNIT I: LOW POWER DESIGN, AN OVER VIEW: Introduction to low- voltage low power design, limitations, Silicon-on-Insulator.

UNIT II: MOS/Bi-CMOS PROCESSES: Bi-CMOS processes, Integration and Isolation considerations, Integrated Analog/Digital CMOS Process.

UNIT III: LOW-VOLTAGE/LOW POWER CMOS/ BICMOS PROCESSES: Deep submicron processes, SOI CMOS, lateral BJT on SOI, future trends and directions of CMOS/Bi-CMOS processes.

UNIT IV: DEVICE BEHAVIOR AND MODELING: Advanced MOSFET models, limitations of MOSFET models, Bipolar models. Analytical and Experimental characterization of sub-half micron MOS devices, MOSFET in a Hybrid mode environment.

UNIT V: CMOS AND Bi-CMOS LOGIC GATES: Conventional CMOS and Bi-CMOS logic gates, Performance Evaluation.

UNIT VI: LOW- VOLTAGE LOW POWER LOGIC CIRCUITS: Comparison of advanced Bi-CMOS Digital circuits. ESD-free Bi-CMOS, Digital circuit operation and comparative Evaluation.

UNIT VII: LOW POWER LATCHES AND FLIP FLOPS: Evolution of Latches and Flip flops-quality measures for latches and Flip flops, Design perspective.

UNIT VIII: SPECIAL TECHNIQUES: Power Reduction in Clock Networks, CMOS Floating Node, Low Power Bus, Delay Balancing, Low Power Techniques for SRAM.

TEXT BOOKS:

1. CMOS/Bi-CMOS ULSI low voltage, low power by Yeo Rofail/ Gohl (3 Authors)-Pearson Education Asia 1st Indian reprint, 2002.
2. Gary K. Yeap,"Practical Low Power Digital VLSI Design", KAP, 2002.

REFERENCES:

1. Basic VLSI Design,Douglas A.Pucknell & Kamran Eshraghian,3rd edition PHI.
2. Digital Integrated circuits, J.Rabaey PH. N.J 1996
3. CMOS Digital ICs Sung-mo Kang and yusuf leblebici 3rd edition TMH 2003.
4. IEEE Trans Electron Devices, IEEE J.Solid State Circuits, and other National and International Conferences and Symposia.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

M.Tech. I SEMESTER (DECS)	**L**	**C**
	3	**2**

(9D06107) DIGITAL SYSTEM DESIGN LAB

CYCLE 1:

1. Simulation and Verification of Logic Gates.
2. Design and Simulation of Half adder, Serial Binary Adder, Multi Precession Adder, Carry Look Ahead Adder and Full Adder.
3. Simulation and Verification of Decoder, MUXs, Encoder using all Modeling Styles.
4. Modeling of Flip-Flops with Synchronous and Asynchronous reset.
5. Design and Simulation of Counters- Ring Counter, Johnson Counter, and Up- Down Counter, Ripple Counter.
6. Design of a N- bit Register of Serial-in Serial-out, Serial in Parallel out, Parallel in Serial out and Parallel in Parallel Out.
7. Design of Sequence Detector (Finite State Machine- Mealy and Moore Machines).
8. 4- Bit Multiplier, Divider. (for 4-Bit Operand)
9. Design ALU to Perform – ADD, SUB, AND-OR, 1's and 2's COMPLIMENT, Multiplication, Division.

CYCLE 2: After completing cycle 1, Digital Circuit Description Using Verilog/ VHDL.

1. Verification of the Functionality of the circuit using function Simulators.
2. Timing Simulator for Critical Path time Calculation.
3. Synthesis of Digital Circuit.
4. Place and Router Techniques for FPGA's like Xilinx, Altera, Cypress, etc.,
5. Implementation of Design using FPGA and CPLD Devices.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

M.Tech. II SEMESTER (DECS) **Th 4** **C 4**

(9D06201) MICRO COMPUTER SYSTEM DESIGN

UNIT I: REVIEW OF 8086 PROCESSOR: Architecture, Register organization, Addressing Modes and Instruction Set (Brief treatment only), Difference between 8086 and 8088 with rest to pin structures.

UNIT II: THE 80286 MICRO PROCESSORS: Architecture, Register Organization, Addressing Modes and instruction sets of 80286 (brief treatment only)

UNIT III: THE 80386, AND 80486 MICRO PROCESSORS: Architectural features, Register Organization, Memory management, Virtual 8086 mode, The Memory Paging Mechanism, Pin Definitions of 80386 and 80486 (brief treatment).

UNIT IV: THE PENTIUM AND PENTIUM PRO PROCESSORS: The Memory System, Input/output system, Branch Pridiction Logic, Cache Structure, Pentium Registers, Serial Pentium pro features.

UNIT V: THE PENTIUM IV AND DUAL CORE MICRO PROCESSORS: Architecture, Special Registers and Pin Structures (brief treatment only)

UNIT VI: I/O PROGRAMMING: Fundamentals of I/O Considerations Programmed I/O, Interrupt I/O, Block Transfers and DMA, I/O Design Example.

UNIT VII: INTRODUCTION TO MULTIPROGRAMMING: Process Management, Semaphores Operations, Common Procedure Sharing, Memory Management, Virtual Memory Concept of 80286 and other advanced Processors.

UNIT VIII: ARITHMETIC COPROCESSOR, MMX AND SIMD TECHNOLOGIES: Data formals for Arithmetic Coprocessor, Internal Structure of 8087 and Advanced Coprocessors. Instruction Set (brief treatment).

TEXTBOOKS:

1. Barry, B. Brey, "The Intel Microprocessors,"8th Edition Pearson Education, 2009.
2. A.K. Ray and K.M. Bhurchandi,"Advanced Microprocessor and Peripherals," TMH.

REFERENCES:

1. YU-Chang, Glenn A. Gibson, "Micro Computer Systems: The 8086/8088 Family Architecture, Programming and Design" 2nd Edition, Pearson Education, 2007.
2. Douglas V. Hall, "Microprocessors and Interfacing," Special Indian Edition, 2006.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

M.Tech. II SEMESTER (DECS) **Th 4** **C 4**

(9D06202) HI-SPEED NETWORKS

UNIT I: NETWORK SERVICES & LAYERED ARCHITECTURE: Traffic characterization and quality of service, Network services, High performance networks, Network elements, Basic network mechanisms, layered architecture.

UNIT II: ISDN & B-ISDN: Over view of ISDN, ISDN channels, User access, ISDN protocols, Brief history of B-ISDN and ATM, ATM based services and applications, principles and building block of B-ISDN, general architecture of B-ISDN, frame relay.

UNIT III: ATM NETWORKS: Network layering, switching of virtual channels and virtual paths, applications of virtual channels and connections.

UNIT IV: QOS parameters, traffic descriptors, ATM service categories, ATM cell header, ATM layer, ATM adaptation layer.

UNIT V: INTERCONNECTION NETWORKS: Introduction, Banyan Networks, Routing algorithm & blocking phenomenon, Batcher-Banyan networks, crossbar switch, three stage class networks.

UNIT VI: REARRANGEABLE NETWORKS: Rearrangeable class networks, folding algorithm, bens network, looping algorithm.

UNIT VII: ATM SIGNALING, ROUTING AND TRAFFIC CONTROL: ATM addressing, UNI signaling, PNNI signaling, PNNI routing, ABR Traffic management.

UNIT VIII: TCP/IP NETWORKS: History of TCP/IP, TCP application and Services, Motivation, TCP, UDP, IP services and Header formats, Internetworking, TCP congestion control, Queue management: Passive & active, QOS in IP networks: differentiated and integrated services.

TEXT BOOKS:

1. ISDN & B-ISDN with Frame Relay – William Stallings, PHI.
2. Communication Networks - Leon Garcia widjaja, TMH, 2000.
3. ATM Fundamentals – N. N. Biswas, Adventure books publishers, 1998.

REFERENCES:

1. High Performance TCP/IP Networking-Mahbub Hassan, Raj Jain, PHI, 2005.
2. ATM Networks-Rainer Handel, Manfred N.Hubber, Stefan Schroder, Pearson Edu, 2002
3. High Speed Networks and Internets – William Stallings, Pearson edu., 2002.
4. High Performance Communication Networks – T. Walrand & P. Varaiya, 2nd ed., Harcourt Asia Publ.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

M.Tech. II SEMESTER (DECS) **Th 4** **C 4**

(9D38203) WIRELESS COMMUNICATIONS

UNIT I- INTRODUCTION TO WIRELESS COMMUNICATIONS SYSTEMS: Evolution, Examples of Wireless Communication systems, Comparision, Second Generation Cellular Networks, WLL, Bluetooth and Personal Area Networks.

UNIT II- MOBILE RADIO PROPAGATION: Large-Scale Path Loss, Introduction to Radio Wave Propagation, Free Space Propagation Model, Propagation Mechanisms, Reflection, Ground Reflection (Two-Ray) Model, Diffraction, Scattering.
Small-Scale Fading and Multipath, Impulse Response Model of a Multipath Channel, Small-Scale Multipath Measurements, Parameters of Mobile Multipath Channels, Types of Small-Scale Fading, Rayleigh and Ricean Distributions, Statistical Models for Multipath Fading Channels, Theory of Multipath Shape Factors for Small-Scale Fading Wireless Channels.

UNIT III- DIVERSITY TECHNIQUES: Repetition coding and Time Diversity- Frequency and Space Diversity, Receive Diversity- Concept of diversity branches and signal paths- Combining methods- Selective diversity combining - Switched combining- maximal ratio combining- Equal gain combining- performance analysis for Rayleigh fading channels.

UNIT IV- CELLULAR COMMUNICATION: Cellular Networks, Multiple Access: FDM/TDM/FDMA/TDMA, Spatial reuse, Co-channel interference Analysis, Hand over Analysis, Erlang Capacity Analysis, Spectral efficiency and Grade of Service- Improving capacity - Cell splitting and sectorization.

UNIT V- SPREAD SPECTRUM AND CDMA: Motivation- Direct sequence spread spectrum- Frequency Hopping systems, Time Hopping., Anti-jamming- Pseudo Random (PN) sequence, Maximal length sequences, Gold sequences, Generation of PN sequences.

UNIT VI- DIVERSITY IN DS-SS SYSTEMS: Rake Receiver- Performance analysis. Spread Spectrum Multiple Access, CDMA Systems- Interference Analysis for Broadcast and Multiple Access Channels, Capacity of cellular CDMA networks- Reverse link power control, Hard and Soft hand off strategies.

UNIT VII- FADING CHANNEL CAPACITY: Capacity of Wireless Channels- Capacity of flat and frequency selective fading channels, Multiple Input Multiple output (MIMO) systems- Narrow band multiple antenna system model, Parallel Decomposition of MIMO Channels- Capacity of MIMO Channels.

UNIT VIII- CELLULAR WIRELESS COMMUNICATION STANDARDS: GSM specifications and Air Interface, specifications, IS 95 CDMA- 3G systems: UMTS & CDMA 2000 standards and specifications.

TEXT BOOKS:

1. Andrea Goldsmith, "Wireless Communications", Cambridge University press.
2. Simon Haykin and Michael Moher, "Modern Wireless Communications", Person Education.
3. T.S. Rappaport, "Wireless Communication, principles & practice", PHI, 2001.

REFERENCES:

1. G.L Stuber, "Principles of Mobile Communications", 2nd edition, Kluwer Academic Publishers.
2. Kamilo Feher, 'Wireless digital communication', PHI, 1995.
3. R.L Peterson, R.E. Ziemer and David E. Borth, "Introduction to Spread Spectrum Communication", Pearson Education.
4. A.J.Viterbi, "CDMA- Principles of Spread Spectrum", Addison Wesley, 1995.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

M.Tech. II SEMESTER (DECS) **Th** **C**
4 **4**

(9D38204) CODING THEORY & TECHNIQUES

UNIT I: SOURCE CODING: Mathematical model of Information, A Logarithmic Measure of Information, Average and Mutual Information and Entropy, coding for Discrete less sources, Source coding theorem, fixed length and variable length coding, properties of prefix codes.

UNIT II: Shannon-Fano coding, Huffman code, Huffman code applied for pair of symbols, efficiency calculations, Lempel-Ziv codes.

UNIT III: LINEAR BLOCK CODES: Introduction to Linear block codes, Generator Matrix, Systematic Linear Block codes, Encoder Implementation of Linear Block Codes, Parity Check Matrix, Syndrome testing, Error Detecting and correcting capability of Linear Block codes.

UNIT IV: Hamming Codes, Probability of an undetected error for linear codes over a Binary Symmetric Channel, Weight Enumerators and Mac-Williams identities, Perfect codes, Application of Block codes for error control in data storage Systems.

UNIT V: CYCLIC CODES: Algebraic structure of cyclic codes, Binary Cyclic code properties, Encoding in systematic and non-systematic form, Encoder using (n-k) bit shift register, Syndrome Computation and Error detection, Decoding of Cyclic Codes.

UNIT VI: CONVOLUTIONAL CODES: encoding of Convolutional codes, Structural properties of Convolutional codes, state diagram, Tree diagram, Trellis Diagram, maximum, Likelihood decoding of Convolutional codes.

UNIT VII: Viterbi Algorithm, Fano, Stack Sequential decoding algorithms, Application of Viterbi and sequential decoding.

UNIT VIII: BCH CODES: Groups, fields, binary Fields arithmetic, construction of Falois fields GF (2^m), Basic properties of Falois Fields, Computation using Falois Field GF (2^m) arithmetic, Description of BCH codes, Decoding procedure for BCH codes.

TEXT BOOKS:

1. SHU LIN and Daniel J. Costello, Jr. "Error Control Coding – Fundamentals and Applications", Prentice Hall Inc.
2. Bernard sklar,"Digital Communications-Fundamental and Application", Pearson Education, Asia.
3. Man Young Rhee, "Error Control Coding Theory", McGraw Hill Publ.

REFERENCES:

1. John G. Proakis, "Digital Communications", Mc. Graw Hill Publication.
2. K. Sam Shanmugam, "Digital and Analog Communication Systems", Wisley Publications.
3. Symon Haykin, "Digital Communications", Wisley Publications.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

M.Tech. II SEMESTER (DECS) **Th 4** **C 4**

(9D38205) DETECTION & ESTIMATION OF SIGNALS

UNIT I

DETECTION THEORY: Binary decisions - Single observation- Maximum likelihood decision criterion, Neymann-Pearson criterion, Probability of error criterion, Bayes risk criterion, Minimax criterion, Robust detection, Receiver operating characteristics.

UNIT II&III

BINARY DECISIONS - MULTIPLE OBSERVATIONS: Vector observations, the general Gaussian Problem, Waveform Observation in Additive Gaussian Noise, The Integrating Optimum Receiver; Matched Filter Receiver.

UNIT IV&V

ESTIMATION THEORY: Methods -Maximum likelihood estimation; Bayes cost method Bayes estimation criterion - Mean square error criterion; Uniform cost function; absolute value cost function; Linear minimum variance - Least squares method; Estimation in the presence of Gaussian noise - Linear observation; Non-linear estimation.

UNIT VI

PROPERTIES OF ESTIMATORS: Bias, Efficiency, Cramer Rao bound Asymptotic properties, Sensitivity and error analysis.

UNIT VII
STATE ESTIMATION: Prediction, Kalman filter.

UNIT VIII
SUFFICIENT STATISTICS AND STATISTICAL ESTIMATION OF PARAMETERS: Concept of sufficient statistics, Exponential families of Distributions, Exponential families and Maximum likelihood estimation, uniformly minimum variance unbiased estimation.

TEXT BOOKS:

1. James L. Melsa and David L. Cohn, "Decision and Estimation Theory," McGraw Hill, 1978.
2. Dimitri Kazakos, P. Papantoni Kazakos, "Detection and Estimation," Computer Science Press, 1990.
3. Steven M. Kay, "Statistical Signal Processing: Vol. 1: Estimation Theory, Vol. 2: Detection Theory," Prentice Hall Inc., 1998.

REFERENCES:

1. Harry L. Van Trees, "Detection, Estimation and Modulation Theory, Part 1," John Wiley & Sons Inc. 1968.
2. Jerry M. Mendel, "Lessons in Estimation Theory for Signal Processing, Communication and Control," Prentice Hall Inc., 1995
3. Sophocles J. Orfanidis, "Optimum Signal Processing," 2 nd edn., McGraw Hill, 1988.
4. Monson H. Hayes, "Statistical Digital Signal Processing and Modeling," John Wiley & Sons Inc., 1996.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

M.Tech. II SEMESTER (DECS) **Th 4** **C 4**

ELECTIVE II
(9D06205a) IMAGE & VIDEO PROCESSING

UNIT I- IMAGE REPRESENTATION: Gray scale and colour Images, image sampling and quantization. Two dimensional orthogonal transforms: DFT, WHT, Haar transform, KLT, DCT.

UNIT II- IMAGE ENHANCEMENT: Filters in spatial and frequency domains, histogram-based processing, homomorphic filtering. Edge detection, non parametric and model based approaches, LOG filters, localization problem.

UNIT III- IMAGE RESTORATION: Degradation Models, PSF, circulant and block - circulant matrices, deconvolution, restoration using inverse filtering, Wiener filtering and maximum entropy-based methods.

UNIT IV- IMAGE SEGMENTATION: Pixel classification, Bi-level Thresholding, Multi-level Thresholding, P-tile method, Adaptive Thresholding, Spectral & spatial classification, Edge detection, Hough transform, Region growing.

UNIT V- FUNDAMENTAL CONCEPTS OF IMAGE COMPRESSION: Compression models, Information theoretic perspective, Fundamental coding theorem.

UNIT VI- LOSSLESS COMPRESSION: Huffman Coding, Arithmetic coding, Bit plane coding, Run length coding, Lossy compression: Transform coding, Image compression standards.

UNIT VII- VIDEO PROCESSING: Representation of Digital Video, Spatio-temporal sampling, Motion Estimation.

UNIT VIII- Video Filtering, Video Compression, Video coding standards.

TEXT BOOKS/REFERENCES:

1. R. C. Gonzalez, R. E. Woods,"Digital Image Processing", Pearson Education. 2nd edition,2002
2. W. K. Pratt, "Digital image processing", Prentice Hall, 1989
3. A. Rosenfold and A. C. Kak, "Digital image processing", Vols. 1 and 2, Prentice Hall, 1986.
4. H. C. Andrew and B. R. Hunt, "Digital image restoration", Prentice Hall, 1977
5. R. Jain, R. Kasturi and B.G. Schunck, "Machine Vision", McGraw-Hill International Edition, 1995
6. A. M. Tekalp, "Digital Video Processing", Prentice-Hall, 1995
7. A. Bovik, "Handbook of Image & Video Processing", Academic Press, 2000

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

M.Tech. II SEMESTER (DECS) **Th 4** **C 4**

ELECTIVE II
(9D38206b) OPTICAL COMMUNICATION

UNIT I

INTRODUCTION: Evolution of fiber types, guiding properties of fibers, cross talk between fibers, coupled modes and mode mixing, dispersion properties of fibers, nonlinear properties of optical fibers, SRS, SBS, intensity dependent refractive index; Fiber design considerations: diameter, cladding, thickness, low and high bit rate systems, characterization of materials for fibers, fiber perform preparation, fiber drawing and control, roles of coating and jacketing;

UNIT II

OPTICAL AND MECHANICAL CHARACTERIZATION OF FIBERS, OPTICAL CABLE DESIGN: Design objectives and cable structures, fiber splicing, fiber end preparation, single and array splices, measurement of splicing efficiency, optical fiber connectors, connector alignments, optical sources for communication, LED, injection lasers, modulation technique, direct and indirect methods, optical waveguide devices

UNIT III

OPTICAL DETECTORS: Photodiodes in repeaters, receiver design, digital and analog, transmission system design, system design choices, passive and low speed active optical components for fiber system, micro-optic components, lens-less components.

UNIT IV

OPTICAL FIBER COMPONENTS: couplers, Isolators and Circulators, Multiplexers, Bragg grating, Fabry-perot Filters, Mach zender interfermometers, Arrayed waveguide grating, tunable filters, hi-channel count multiplexer architectures, optical amplifiers, direct and external modulation transmitters, pump sources for amplifiers, optical switching and wave length converters.

UNIT V

OPTICAL FIBER TECHNIQUES-1: Modulation and demodulation, signal formats, direction detection receivers, coherent detection.

UNIT VI

OPTICAL FIBER TECHNIQUES-2: Optical switching, polarization control, inter office transmission system, trunking system, performance and architecture, under sea cable system, optical fibers in loop distribution system, photonic local network.

UNIT-VII

ACCESS NETWORK: Network architecture, HFC, FTTC, optical access network architecture, deployment considerations, upgrading the transmission capacity, SDM, TDM, WDM, application areas, inter exchange, undersea, local exchange networks; Packaging and cabling of photonics components- photonic packet switching, OTDM, multiplexing and demultiplexing, optical logic gates, synchronization, broadcast OTDM network, OTDM testbeds.

UNIT-VIII

SOLITON COMMUNICATION: Basic principle, metropolitan optical network, cable TV network, optical access network, photonics simulation tools, error control coding techniques, nonlinear optical effects in WDM transmission.

TEXT BOOKS:

1. Gil Held, "Deploying Optical Network Components".
2. Gerd Kaiser, "Optical Fiber Communication", McGraw Hill.
3. Rajiv Ramaswamy and Kumar and N. Sivaranjan, "Optical Networks".

REFERENCES:

1. S E Miller, A G Chynoweth, "Optical Fiber Telecommunication".
2. S E Miller, I Kaninov, "Optical Fiber Telecommunication II".
3. I Kaninov, T Li, "Optical Fiber Telecommunication IV B".
4. John. M. Senior, "Optical fiber communications: Principles and Practice".
5. Govind Agarwal, "Optical Fiber Communications".

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

M.Tech. II SEMESTER (DECS)	**Th**	**C**
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ELECTIVE II

(9D38206c) COMPRESSION TECHNIQUES

UNIT I&II: REVIEW OF INFORMATION THEORY: The discrete memoryless information source, Kraft inequality; optimal codes Source coding theorem. Compression Techniques, Lossless and Lossy Compression, Mathematical Preliminaries for Lossless Compression, Huffman Coding, Optimality of Huffman codes, Extended Huffman Coding, Adaptive Huffman Coding, Arithmetic Coding, Adaptive Arithmetic coding, Run Length Coding.

UNIT III: DICTIONARY TECHNIQUES: Static Dictionary, Adaptive Dictionary, LZ77, LZ78, LZW, Applications, Predictive Coding, Prediction with Partial Match, Burrows Wheeler Transform, Sequitur, Lossless Compression Standards (files, text, and images, faxes), Dynamic Markov Compression.

UNIT IV: MATHEMATICAL PRELIMINARIES FOR LOSSY CODING: Rate distortion theory: Rate distortion function R(D),Properties of R(D); Calculation of R(D) for the binary source and the Gaussian source, Rate distortion theorem, Converse of the Rate distortion theorem,

UNIT V: QUANTIZATION: Uniform & Non-uniform, optimal and adaptive quantization, vector quantization and structures for VQ, Optimality conditions for VQ, Predictive Coding, Differential Encoding Schemes.

UNIT VI: MATHEMATICAL PRELIMINARIES FOR TRANSFORMS: Karhunen Loeve Transform, Discrete Cosine and Sine Transforms, Discrete Walsh Hadamard Transform, Lapped transforms- Transform coding, Subband coding, Wavelet Based Compression, Analysis/Synthesis Schemes.

UNIT VII: DATA COMPRESSION STANDARDS: Zip and Gzip, Speech Compression Standards: MPEG, JPEG 2000. MPEG, H264.

UNIT VIII: IMAGE COMPRESSION STANDARDS: Binary Image Compression Standards, Continuous Tone Still Image Compression Standards, Video Compression Standards.

TEXT BOOKS:

1. Khalid Sayood, "Introduction to Data Compression", Morgan Kaufmann Publishers., Second Edn., 2005.
2. David Salomon, "Data Compression: The Complete Reference", Springer Publications, 4th Edn., 2006.
3. Thomas M. Cover, Joy A. Thomas, "Elements of Information Theory," John Wiley & Sons, Inc.,1991.

REFERENCES:

1. Toby Berger, "Rate Distortion Theory: A Mathematical Basis for Data Compression", Prentice Hall, Inc., 1971.
2. K.R.Rao, P.C.Yip, "The Transform and Data Compression Handbook", CRC Press., 2001.
3. R.G.Gallager, "Information Theory and Reliable Communication", John Wiley & Sons, Inc., 1968.
4. Ali N. Akansu, Richard A. Haddad, "Multiresolution Signal Decomposition: Transforms, Subbands and Wavelets", Academic Press., 1992
5. Martin Vetterli, Jelena Kovacevic, "Wavelets and Subband Coding", Prentice Hall Inc., 1995.
6. Rafael C. Gonzalez, Richard E. Woods, "Digital Image Processing", Pearson Education.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

M.Tech. II SEMESTER (DECS) **L C**
3 2

(9D38207) COMMUNICATIONS & SIGNAL PROCESSING LAB

1. Simulation Rayleigh Fading Channel Using Either Clarke's Model or Jake's Model for different Dopler Spreads (Ex. 50 Hz and 100 Hz).
2. Generation of Maximal Sequences and Gold Sequences.
3. Design and Simulation FIR Filter Using any Windowing Technique.
4. Design of IIR Filters from Analog Filters.
5. Performance Evaluation of QPSK System over Gaussian AWGN Channel.
6. Performance Evaluation of QPSK System over Rayleigh Fading Channel.
7. Equalization of Multipath Channel using LMS or RLS Algorithms.
8. Performance Evaluation of RAKE Receiver over Slow Fading Channel.

NOTE: Use Matlab / COM SIM.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

M.Tech. IV SEMESTER (DECS) **C**
2

(9D38401) SEMINAR

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

M.Tech. IV SEMESTER (DECS) **C**
16

(9D38402) PROJECT WORK

The Project Work should be on a contemporary topic relevant to the core subjects of the course. It should be original work of the candidate.

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