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.

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JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR
ANANTAPUR

Course Structure for M.Tech. in Communication Systems (CS)

M. Tech. – I Semester

s.no.	Subject Code	Title	L	T	P	Credits
01	9D61101	Advanced Mathematics for Communication Systems	3	1	0	4
02	9D61102	Modern Digital Communication Techniques	3	1	0	4
03	9D38205	Detection and Estimation of Signals	3	1	0	4
04	9D61103	Computer Communication Networks	3	1	0	4
05	9D61104	Information and Coding Techniques	3	1	0	4
06	 9D61105a 9D08202 9D61105b	***Elective – I*** 1. Digital Voice & Picture Communication 2. Mobile Ad-hoc Networks 3. Radar Signal Processing	3	1	0	4
07	9D61106	Communication Lab I	0	0	3	2
		Total Credits				**26**

M. Tech. – II Semester

s.no.	Subject Code	Title	L	T	P	Credits
01	9D61201	Wireless Communications and Fading	3	1	0	4
02	9D61202	Digital Satellite Communications	3	1	0	4
03	9D61203	Adaptive Filter Theory	3	1	0	4
04	9D61204	Optical Fiber Communications	3	1	0	4
05	9D61205	RF Systems and Circuits	3	1	0	4
06	9D61206a 9D61206b 9D06205	***Elective – II*** 1. MIMO Communication Systems 2. Secure Communication 3. Image and Video Processing	3	1	0	4
07	9D61207	Communication Lab II	0	0	3	2
		Total Credits				**26**

M. Tech. – III & IV Semesters

Subject Code	Title		Credits
9D61401	Seminar		02
9D61402	Project Work		16
	Total Credits		**18**

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ANANTAPUR

I Year M.Tech (CS) **L P C**
I Semester **4 – 4**

(9D61101) ADVANCED MATHEMATICS FOR COMMUNICATION SYSTEMS

UNIT I

RANDOM VARIABLES: Probability axioms, conditional probability, discrete and continuous random variables, cumulative distribution function (CDF), probability mass function (PMF), probability density function (PDF), conditional PMF/PDF, expected value, variance, functions of a random variable, Expected value of the derived random variable.

UNIT II

MULTIPLE RANDOM VARIABLES: Multiple random variables, joint CDF/PMF/PDF, functions of multiple random variables, multiple functions of multiple random variables, independent/uncorrelated random variables, sums of random variables, moment generating function, random sums of random variables.

UNIT III

FUNDAMENTAL THEOREMS: The sample means, laws of large numbers, central limit theorem, Confidence intervals, convergence of sequence of random variables, long Term Arrival Rates and Associated Averages.

UNIT IV

RANDOM PROCESSES: Definition of random processes, specifying random processes, Examples of Discrete-time Random Processes, Examples of Continuous-time Random Processes, Stationary Random Processes, Continuity, Derivatives, and Integrals of random Processes.

UNIT V

Time Averages of Random Processes and ergodic Theorems, Fourier series and karhunen-Loeve Expansion, Power Spectral Density, Response of linear Systems to Random Signals, Amplitude Modulation by Random Signals, Optimum Linear Systems, and Estimating the Power Spectral Density.

UNIT VI

RESPONSE OF PROCESSES TO LTI SYSTEMS: Mean and correlation of random processes, stationary, wide sense stationary and ergodic processes. Random processes as inputs to linear time invariant systems: power spectral density, Gaussian processes as inputs to LTI systems, white Gaussian noise, In-Phase and quadrature representation of random processes.

UNIT VII

MARKOV CHAINS: Markov processes, discrete-time markov chains, continuous -time markov chains, Classes of States, Recurrence Properties, and Limiting probabilities, Time –Reserved markov chains.

UNIT VIII

QUEUEING THEORY: The elements of a Queueing Theory, little's formula, The M/M/I Queue, Multi-Server Systems: M/M/c, M/M/c/c, M/M/∞, Finite-Source queueing Systems, M/G/I Queueing Systems, M /G/I Analysis Using Embedded markov chains, Burke's Theorem: Departures from M/M/c Systems, Networks of Queues: Jackson's Theorem

TEXT BOOKS:

1. Albert Leon Garcia: "Probability and Random Processes for Electrical Engineering", Prentice Hall 1993
2. A. Papoulis and S. U. Pillai, "Probability, Random Variables and Stochastic Processes", 4th Edition, McGraw Hill 2002

REFERENCES:

1. Yannis Viniotis, "Probability and Random Processes for Electrical Engineers" McGraw-Hill College, 1998
2. V. Krishnan: "Probability and Random Processes", John Wiley & Sons 2006
3. Geoffrey Grimmett, "Probability and Random Processes", 3rd edition, Oxford University Press 2001
4. Henry Stark and John W. Woods, "Probability and Random Processes with Applications to Signal Processing", Prentice Hall, 3rd Edition 2001

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ANANTAPUR

I Year M.Tech (CS) **L P C**
I Semester **4 – 4**

(9D61102) MODERN DIGITAL COMMUNICATION TECHNIQUES

UNIT I

FUNDAMENTALS OF SIGNAL PROCESSING: Linear system analysis- impulse response, transfer functions and their relations, time domain and frequency domain analysis of linear systems with random inputs, system and signal bandwidth, narrow band Gaussian noise, filtering of modulated signals, non-linear processing, Optimum filtering-Wiener filters, Matched filters.

UNIT II

CHARACTERIZATION OF COMMUNICATION SIGNALS AND SYSTEMS: Representation of Band Pass Signals and Systems, Signal Space Representation, Representation
Of digitally modulated signals, Spectral Characteristics of Digitally Modulated signals.

UNIT III

DIGITAL MODULATION TECHNIQUES: Factors that Influencing digital modulation techniques, Linear Modulation Techniques – BPSK, DPSK, QPSK, OQPSK, ∏/4 QPSK, Constant envelope Modulation techniques - MSK, GMSK, Linear and constant envelope modulation techniques – M-ary PSK, M- ary QAM.

UNIT IV

COMMUNICATION OVER ADDITIVE GAUSSIAN NOISE CHANNELS: Optimum receiver for signals corrupted by (AWGN), Performance of the optimum Receiver for Memory less Modulation, Optimum Receiver for CPM signals, Optimum Receiver for Signals With Random Phase in AWGN Channel.

UNIT V

COMMUNICATION THROUGH BAND LIMITED LINEAR FILTER CHANNEL: Optimum Receiver for Channels with ISI and AWGN, Linear Equalization and its Variations, Decision Feedback Equalization.

UNIT VI

FUNDAMENTALS OF SPREAD SPECTRUM: general concepts, types of spread spectrum signals, analysis of direct sequence, spread spectrum systems- classification of sequences, properties of M-sequences, partial co-relation, spreading & dispreading of PN signals, interference rejection, output signal to noise ratio, antijam characteristics, energy and bandwidth efficiency.

UNIT VII

GENERATION OF SPREAD SPECTRUM SIGNALS: shift register sequence generators, discrete frequency synthesizers, generation of gold sequences and their correlation properties, generation of OVSF codes and their properties.

UNIT VIII

SYNCHRONIZATION OF SPREAD SPECTRUM SYSTEMS: Coherent Direct-Sequence Receivers, Carrier Tracking- Coherent & Non Coherent, Delay-Lock Loop Analysis, Tau-Dither Loop, Acquisition of Spread-Spectrum Signals, and Matched filters for PN Sequences, Applications of spread spectrum signals to communications, multi axis considerations.

TEXT BOOKS:

1. "MODERN COMMUNICATIONS AND SPREAD SPECTRUM", George R. Cooper & Clare D. McGillem, McGraw-Hill Book Company, 1986.
2. "DIGITAL COMMUNICATIONS", John G. Proakis, McGraw Hill, 3rd edition, 1995.

REFERENCES:

1. "WIRELESS DIGITAL COMMUNICATIONS,modulation & spread spectrum applications", Dr.kamilo feher, PHI 1999.
2. "DIGITAL COMMUNICATION, fundamentals and applications", Bernard sklar, Pearson education 2nd edition.
3. "Wireless Communications", THEODORE S.RAPPAPORT, Pearson Education, 2nd edition, 2002.

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ANANTAPUR

I Year M.Tech (CS) **L P C**
I Semester **4 – 4**

(9D38205) DETECTION AND 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, Mini max 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
ANANTAPUR

I Year M.Tech (CS) **L P C**
I Semester **4 – 4**

(9D61103) COMPUTER COMMUNICATION NETWORKS

UNIT I

What is the Internet, The Network Edge, The Network Core, Network Access and physical media, ISPs and Internet Backbones, Delay and Loss in Packet-Switched networks, history of computer networking and the internet.

UNIT II

APPLICATION LAYER: Principles of application layer protocols, the web and HTTP, File transfer: FTP, Electronic mail in the internet, DNS- the internet's directory service, Socket programming with TCP, Socket programming with UDP, Building a simple web server, content distribution.

UNIT III

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.

UNIT IV

NETWORK LAYER AND ROUTING: Introduction and network service models, routing principles, hierarchical routing, the internet protocol, routing in the internet, what's inside a router, IPv6, multicast routing, mobility and the network layer.

UNIT V

LINK LAYER AND LOCAL AREA NETWORKS: data link layer: Introduction and services, error-detection and correction techniques, multiple access protocols, LAN addresses and ARP, Ethernet, hubs, bridges, and switches, wireless links, PPP: the point to point protocol, asynchronous transfer mode, frame relay.

UNIT VI

MULTIMEDIA NETWORKING: Multimedia networking applications, streaming stored audio and video, making the best of the best-effort service, protocols for real-time interactive applications, beyond best-effort, scheduling and policing mechanism, integrated services, RSVP, differentiated services.

UNIT VII

SECURITY IN COMPUTER NETWORKS: what is network security, principles of cryptography, authentication, integrity, key distribution and certification, access control: firewalls, attacks and countermeasures, security in many layers: case studies.

UNIT VIII

NETWORK MANAGEMENT: what is network management, the infrastructure for network management, the internet standard management framework, SAN.1.

TEXT BOOKS:

1. James. F. Kurose and Keith. W. Ross, "Computer Networks: A top-down approach featuring the Internet", Addison Wesley publications, 3/e, 2004.
2. D. Bertsekas and R. Gallager, "Data Networks", Prentice Hall of India, 2/e, 2000.

REFERENCES:

1. S. Keshav, "An Engineering Approach to Computer Networking", Addison Wesley publications, 2001.
2. L. L. Peterson & B. S. Davie, "Computer Networks: A System Approach", Morgan Kaufman publishers, 4/e.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR
ANANTAPUR

I Year M.Tech (CS) **L P C**
I Semester **4 – 4**

(9D61104) INFORMATION AND CODING TECHNIQUES

UNIT I

Entropy: Memory less sources- Markov sources- Entropy of a discrete Random variable- Joint, conditional and relative entropy- Mutual Information and conditional mutual information.

Chain relation for entropy, relative entropy and mutual Information, Loss less Source coding: Uniquely decodable codes- Instantaneous codes- Kraft's inequality - Optimal codes- Huffman code- Shannon's Source Coding Theorem.

UNIT II

Asymptotic Equipartition Property (AEP) - High probability sets and typical sets- Method of typical sequence as a combinatorial approach for bounding error probabilities.

Channel Capacity- Capacity computation for some simple channels

UNIT III

Coding theorems: Arimoto-Blahut algorithm- Fano's inequality-Proof of Shannon's Channel Coding Theorem and its converse. Differential Entropy- Joint, relative and conditional differential entropy- Mutual information.

UNIT IV

Mutual information and Capacity calculation for Band limited Gaussian channels- Shannon limit- Parallel Gaussian Channels-Capacity of channels with colored Gaussian noise.

UNIT V

Rate Distortion Theory: Introduction - Rate Distortion Function - Properties - Continuous Sources and Rate Distortion measure.

Rate Distortion Theorem - Converse - Information Transmission Theorem - Rate Distortion Optimization.

UNIT VI

Channel Coding-1: Waveform Coding, Types of Error Control, Structured Sequences, Linear Block Codes, Error-Detecting and Correcting Capability, Usefulness of the Standard Array, Cyclic Codes, Well-Known Block Codes.

UNIT VII

Channel Coding-2: Convolutional Encoding, Convolutional Encoder Representation, Formulation of the Convolutional Decoding Problem, Properties of Convolutional Codes, Other Convolutional Decoding Algorithms.

UNIT VIII

Channel Coding-3: Reed-Solomon Codes, Interleaving and Concatenated Codes, Coding and Interleaving Applied to the Compact Disc Digital Audio System, Turbo Codes.

TEXT BOOKS:

1. "Information Theory and Reliable Communication", Robert Gallager, John Wiley & Sons.
2. "Digital Communications:Fundamentals and Applications", Bernard sklar, Pearson Edition ,2nd Edition.
3. "The Theory of Information & Coding", R. J. McEliece, Addison Wesley Publishing Co., 1977.

REFERENCES:

1. "Special Issue on Rate Distortion Theory", IEEE Signal Processing Magazine, November 1998.
2. 5.Thomas M. Cover and Joy A. Thomas, "Elements of Information Theory", John Wiley & Sons, 2006
3. David J. C. MacKay, "Information Theory, Inference and Learning Algorithms", Cambridge University Press, 2003
4. "Rate Distortion Theory A Mathematical Basis for Data Compression" T. Bergu, PH Inc. 1971.

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I Year M.Tech (CS) **L P C**
I Semester **4 – 4**

(9D61105a) DIGITAL VOICE & PICTURE COMMUNICATION
(ELECTIVE I)

UNIT I
Introduction: Digital Coding of Waveforms, Subjective quality, Bit rate and coder complexity, Information theoretical limits.

UNIT II
Waveform Characterization: Characteristics of Speech and Image waveforms, Mathematics of Random Waveforms, Model sources with special Correlations and Spectra.

UNIT III
Quantization: Introduction, Calculation of Quantization Error Variance, Uniform Quantization, Non-Uniform quantization, Logarithmic Quantization, Statistical Properties of Quantization Errors, Use of Dithering in coarse quantization, Transmission error effects, Adaptive quantization.

UNIT IV
Pulse Code Modulation (PCM): Introduction, PCM coding of speech, Video and Audio Waveforms, PCM Systems for high quality speech coding.

UNIT V
Differential PCM: Introduction, Linear Predictors of order 1, 2, 3, and N, Low complexity DPCM systems, Adaptive prediction, Distance sample based predictions for periodic signals.

UNIT VI
Delta Modulation (DM): Introduction, Quantization noise in single integration DM, Double integration, second order prediction, Adaptive Delta modulation, Transmission error effects.

UNIT VII

Sub-Band Coding: Introduction, Transmission rate, SNR and Gain over PCM, The integer-band filter bank, Sub-band coding of speech.

UNIT VIII

Transform Coding: Introduction, Linear Transforms of order N = 2, and N×N Transforms, Optimum Bit allocation and Zonal Sampling, Sub-optimum transforms (DHT, DWHT, DFT, DCT), Adaptive transform coding for speech and images.

TEXT BOOKS:

1. N. S. Jayant and Peter Noll, "Digital Coding of Waveforms – Principles and Applications to Speech and Video," Prentice – Hall, New Jersey.
2. Douglas O'Shaugnessy, "Speech Communication – Human and Machine," IEEE Press, 2000.

REFERENCES:

1. L. R. Rabiner, "Digital Processing of Speech Signals," Pearson, 1978.
2. T. F. Quatieri, "Discrete-time speech signal processing: Principles and Practice," Pearson, 2002.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY
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I Year M.Tech (CS) **L P C**
I Semester **4 – 4**

(9D08202) MOBILE ADHOC NETWORKS

UNIT I

Introduction: Applications, History of Wireless Communication, Simplified Reference Model. Wireless Transmission: Introduction, Frequencies for Radio Transmission, Signals, Modulation, Cellular Spectrums. Wireless LAN: Introduction, Infrared vs Radio Transmission, Infrastructure and Adhoc Networks, IEEE802.11, Hyper LAN, Bluetooth.

UNIT II

Medium Access Control: Introduction, Motivation for a Specialized MAC, SDMA, FDMA, TDMA, CDMA.

UNIT III

Mobile Network Layer: Introduction, Mobile IP, Dynamic Host Configuration Protocol, Adhoc Network.

UNIT IV

Mobile Transport Layer: Introduction, Traditional TCP, Indirect TCP, Snooping TCP, Mobile TCP, Fast Retransmit/Fast Recovery, Transmission/Time Out Freezing, Selective Retransmission, Transmission Oriented TCP.

UNIT V

Adhoc Networks: Fundamentals: Fundamentals of Wireless Communication Technology, The Electromagnetic Spectrum, Radio Propagation Mechanisms, Characteristics of the Wireless Channel. Adhoc Routing Protocols: Introduction, Issues in Designing A Routing Protocol for Ad Hoc Wireless Networks, Classifications of Routing Protocols, Destination Sequenced Distance Vector (DSDV), Wireless Routing Protocol (WRP), Ad Hoc on-Demand Distance Vector Routing (AODV), Dynamic Source Routing (DSR), Temporally Ordered Routing Algorithm (TORA), Signal Stability Routing (SSR), Location-Aided Routing (LAR), Power-Aware Routing (PAR), Zone Routing Protocol (ZRP).

UNIT VI

Multicast Routing in Adhoc Networks: Introduction, 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- Bandwidth Efficient Multicast Routing Protocol, Zone Based – Core Extraction Routing Protocol, Ad Hoc on-Demand Vector Routing Protocol, Mesh-Based Multicast Routing Protocols, On-Demand Multicast Dynamic Core Based Multicast Routing Protocol, Energy-Efficient Reliable Broadcast And Multicasting Protocols, Wireless Ad Hoc Real-Time Multicasting, Application, Dependent Multicast Routing.

UNIT VII

Transport Layer-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, Ad Hoc Transport Protocol, Security in Ad Hoc Wireless Networks, Network Security Requirements, Issues and Challenges in Security Provisioning, Network Security Attacks, Secure Routing in Ad Hoc Wireless Networks, Requirements, Security Aware Ad Hoc Routing Protocol.

UNIT VIII

QoS and Energy Management: Introduction, Issues and Challenges in Providing QoS in Ad Hoc Wireless Networks, Classification of QoS Solutions, MAC Layer Solutions, Cluster TDMA, IEEE802.11e, Network Layer Solutions, QoS Routing Protocols, On-Demand QoS Routing Protocol, QoS Frameworks for Ad Hoc Wireless Networks, QoS Models, QoS Resource Reservation Signalling, INSIGNIA. Energy Management in Ad Hoc Wireless Networks: Introduction, Need for Energy Management in Ad Hoc Wireless Networks, Classification of Energy Management Schemes, Battery Management Schemes.

TEXTBOOKS:

1. Mobile Communications, Jochen Schiller PE, Second Edition, 2004, PEA.
2. Ad Hoc Wireless Networks Architectures and Protocols, C.Siva Ram Murthy and B.S. Manoj, Prentice Hall, 2004.

REFERENCES:

1. Cellular Mobile Communication, Lee, TMH.
2. Mobile and Personal Communication Systems and Services, Pandya, 2003, PHI.
3. Ad Hoc Mobile Wireless Networks Protocols and Systems, C. K. Toh, Prentice Hall, PTR, 2001.
4. Ad Hoc Networking, Charles E.Perkins, Addison Wesley, 2000.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR
ANANTAPUR

I Year M.Tech (CS) **L P C**
I Semester **4 – 4**

(9D61105c) RADAR SIGNAL PROCESSING
(ELECTIVE I)

UNIT I
Introduction– Radar Block Diagram, Radar Equation, Information Available from Radar Echo, Review of Radar Range Performance– General Radar Range Equation, Radar Detection with Noise Jamming, Beacon and Repeater Equations, Bistatic Radar.

UNIT II
Detection of Radar Signals in Noise - I: Matched Filter Receiver – Impulse Response, Frequency Response Characteristic and its Derivation, Matched Filter and Correlation Function, Correlation Detection and Cross-Correlation Receiver. Efficiency of Non-Matched Filters, Matched Filter for Non-White Noise.

UNIT III
Detection of Radar Signals in Noise - II: Detection Criteria – Neyman-Pearson Observer, Likelihood-Ratio Receiver, Inverse Probability Receiver, Sequential Observer, Detectors –Envelope Detector, Logarithmic Detector, I/Q Detector. Automatic Detection - CFAR Receiver, Cell Averaging CFAR Receiver, CFAR Loss, CFAR Uses in Radar, Radar Signal Management –Schematics, Component Parts, Resources and Constraints.

UNIT IV
Waveform Selection [3, 2] : Radar Ambiguity Function and Ambiguity Diagram – Principles and Properties; Specific Cases – Ideal Case, Single Pulse of Sine Wave, Periodic Pulse Train, Single Linear FM Pulse, Noise like Waveforms. Waveform Design Requirements, Optimum Waveforms for Detection in Clutter, Family of Radar Waveforms.

UNIT V
Pulse Compression in Radar Signals: Introduction, Significance, Types. Linear FM Pulse Compression – Block Diagram, Characteristics, Reduction of Time Sidelobes, Stretch Techniques, Generation and Decoding of FM Waveforms – Block Schematic and Characteristics of Passive System, Digital Compression, SAW Pulse Compression.

UNIT VI

Phase Coding Techniques: Principles, Binary Phase Coding, Barker Codes, Maximal Length Sequences (MLS/LRS/PN), Block Diagram of a Phase Coded CW Radar.

UNIT VII

Poly Phase Codes: Frank Codes, Costas Codes, Non-Linear FM Pulse Compression, Doppler Tolerant PC Waveforms – Short Pulse, Linear Period Modulation (LPM/HFM), Sidelobe Reduction for Phase Coded PC Signals.

UNIT VIII

Other Types of PC Waveforms – Basics of Nonlinear Binary Phase Coded Sequences, Complementary Codes, Huffman Codes, Concatenated Barker Codes. Limiting in Pulse Compression, Cross-Correlation Properties, Compatibility, Comparison of Different Pulse Compression Waveforms.

TEXT BOOKS

1 M.I. Skolnik, Radar Handbook, McGraw Hill, 2nd ed., 1991.
2 Fred E. Nathanson, Radar Design Principles – Signal Processing and TheEnvironment, PHI,2nd ed., 1999.
3 M.I. Skolnik, Introduction to Radar Systems, TMH, 3rd ed., 2001.

REFERENCES

1. Peyton Z. Peebles, Jr., Radar Principles, John Wiley, 2004.
2. R. Nit berg, Radar Signal Processing and Adaptive Systems, Artech House, 1999.
3. F.E. Nathanson, Radar Design Principles, McGraw Hill, 1st ed., 1969 & Nelson Morgan, 1/e, Wiley

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR
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I Year M.Tech (CS) **L P C**
I Semester **4 – 4**

(9D61106) COMMUNICATION LAB I

Tools:
Numerical Computing Environments – GNU Octave or MATLAB or any other equivalent tool.

List Of experiments:

1. Generation of discrete time i.i.d. random processes with different distributions (Bernoulli, Binomial, Geometric, Poisson, Uniform, Gaussian, Exponential, Laplacian, Rayleigh, Rician).
2. Communication system Design for Band limited Channels: Signal Design for Zero ISI.
3. Design Of Baseband Communication Systems with Optimum terminal filters.
4. Simulation & performance evaluation of QPSK communication system in AWGN channel.
5. Simulation of maximal sequences of any length & verification of their properties.
6. Generation Of Gold Codes & verification of their properties including auto-correlation & cross correlation.
7. Design and simulation of code matched filter in spread spectrum communication system.
8. Simulation of CSMA and CSMA/CD in Ethernet and LAN Environments.

References:

1. W.H. Tranter, K. Sam Shanmugham, T.S. Rappaport, and K.L. Kosbar, " Principles of Communication System Simulation with Wireless Applications," Pearson, 2004.
2. J.G. Proakis, and M. Salehi, "Contemporary Communication Systems using MATLAB, Bookware Companion Series, 2006.
3. E. Aboelela, "Network Simulation Experiments Manual," The Morgan Kaufmann Series in Networking, 2007.

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ANANTAPUR

I Year M.Tech (CS) **L P C**
II Semester **4 – 4**

(9D61201) WIRELESS COMMUNICATIONS and FADING

UNIT I

INTRODUCTION TO WIRELESS COMMUNICATIONS SYSTEMS: Evaluation, Examples of wireless communications systems, Comparison, Second Generation Cellular Networks, WLL, Bluetooth and Personal Area networks.

UNIT II

LARGE SCALE PATH LOSS AND SHADOWING: Introduction to radio wave propagation, Free Space Propagation Model, Propagation mechanisms, Reflection, Ground Reflection (Two Ray) model, Diffraction, Scattering, outdoor Propagation Model and In door Propagation model.

UNIT III

SMALL SCALE FADING AND MULTIPATH: Small Scale Multipath Propagation, Impulse Response Model of a multipath Channel, Small Scale Multipath Measurements, Parameters of a Mobile Multipath Channels, types of Small Scale Fading, Statistical models for Multipath Fading Channels, Theory of Multipath Shape Factors for Small Scale Fading Wireless Channels.

UNIT IV

DIVERSITY TECHNIQUES: Time Diversity, Frequency Diversity, polarization Diversity and Space Diversity, Receiver Diversity—Concept of diversity branches and signal paths, combing methods: Selective diversity combing, Scanning diversity, maximal ratio combining and Equal gain combining, Performance analysis for Rayleigh fading channels (of selection and maximal ratio combining),RAKE Receiver, Interleaving as time diversity.

UNIT V

CELLULAR CONCEPT- SYSTEM DESIGN FUNDMENTALS: Frequency reuse, Channel assignment strategies, Handoff strategies, Interface and System Capacity—Co-channel Interface and System Capacity, Capacity of Cellular CDMA, Capacity of CDMA with Multiple Cells, Channel Planning for Wireless systems, Adjacent channel interface, Trunking and Grade of Service, Improving Capacity—Cell Splitting and Sectorization,

UNIT VI

ACCESS AND DUPLEX TECHNIQUES: FDMA, TDMA, Frame Slot Format for TDMA Systems, Super Frame Format, Synchronization of Slot, Frame & Super Frame, CDMA, Near Far Problem and Power Control, Synchronization Specific for CDMA, Comparison of FDMA, TDMA, CDMA, FDD&TDD.

UNIT VII

INTRODUCTION TO SPACE-TIME WIRELESS COMMUNICATIONS: Introduction, Exploiting Multiple antennas in wireless links, Space-Time (ST) Channel and Signal Models—SIMO, MISO, MIMO Channels, Physical Scattering Models for ST Channels, Sampled Signal Model, Capacity of ST Channels-Capacity of Frequency flat deterministic MIMO channel, Channel unknown & known to the transmitter, Capacity of random MIMO channels, Capacity to frequency selective MIMO channels.

UNIT VIII

WIRELESS SYSTEMS AND STANDARDS: GSM for Mobile - Specifications and Air Interface, CDMA digital Cellular Standard (IS 95)-Frequency and Channel Specifications, Forward and Reverse Channels, CDMA 3G Systems: UMTS & CDMA 2000 standards and Specifications.

TEXT BOOKS:

1. T.S. Rappaport, " Wireless communications, principals & practice", 2nd edition, PHI 2001
2. Andrea Goldsmith, "Wireless communications", Cambridge university press.
3. Arogya Swamy Paulraj, Rohit Nabar & D.Gore," Introduction to Space-Time Wireless Communications", Cambridge university press, 2003.
4. G.L.Stuber, "Principals of mobile communications", 2nd edition, kluwer academic publishers.

REFERENCES:

1. Seiichi Samei, " Applications of Digital Wireless Technologies to Global Wireless Communications", Prentice Hall PTR,NJ,1997
2. A.J.Viterbi," CDMA- Principals of Spread Spectrum", Addison Wesley, 1995.
3. Kamilo Feher,"Wireless Digital Communication", PHI, 1995.
4. R.L Peterson, R.E. Ziemer and David E.Borth," Introduction to Spread Spectrum Communication", Pearson Education.
5. T L Singal," Wireless Communications", Tata McGraw Hill, 2010.
6. Simon Haykin and Michael," Modern Wireless Communications", Pearson Education.

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ANANTAPUR

I Year M.Tech (CS) **L P C**
II Semester **4 – 4**

(9D61202) DIGITAL SATELLITE COMMUNICATIONS

UNIT I

EFFICIENT TECHNIQUES: Demand Assignment Multiple Access and Digital Speech Interpolation: The ERLANG B Formula-Types of Demand Assignments-DAMA Characteristics-Real-Time Frame Reconfiguration, Frame and Burst Structures for DA-TDMA, Repacking On-Going calls, How Fast is Frame Reconfiguration-DAMA Interfaces-SCPC-DAMA-SPADE-Digital Speech Interpolation-References-Problems.

UNIT II

SATELLITE PACKET COMMUNICATIONS: Preliminaries-Message Transmission By FDMA: The M/G/1 Queue-Message Transmission by TDMA-Pure ALOHA: Satellite Packet Switching-Slotted ALOHA-Packet Reservation-Tree Algorithm.

UNIT III

CARRIER AND SYMBOL TIMING SYNCHRONIZATION: Carrier Recovery For MPSK, Analysis, Performance in Noise-Phase-Locked Loop, Principle Of Operation, Steady-state Tracking Performance, Transient Response, Phase Jitter Due to Noise, Hang-up. Carrier Recovery Circuit With Narrowband Band Pass Filter And Automatic Frequency Control Loop: Single-Tuned Band pass Filter, Double-Tuned Band Pass Filter, Cycle Slipping, Interburst Interference, Burst-to-Burst Frequency Variations-Symbol Timing Recovery Circuit.

UNIT IV

SATELLITE SPREAD SPECTRUM COMMUNICATIONS: Direct Sequence Spread Spectrum Systems, PN Sequence, Error Rate Performance in Uniform Jamming, Error Rate Performance in Pulsed Jamming-Direct Sequence Code Division Multiple Access, Sequence-Synchronous DS-CDMA, Sequence-Asynchronous DS-CDMA, Sequence-Asynchronous MFSK/DS-CDMA, Random Access DS-CDMA, DS-CDMA Link Analysis-Frequency HOP Spread Spectrum Systems-Frequency HOP Code Division Multiple Access-DS Acquisition and Synchronization-FH Acquisition and Synchronization-Satellite on Board Processing.

UNIT V

VERY SMALL APERTURE TERMINAL NETWORKS: VSAT Technologies - Network Configurations-Multi-access and Networking- Network Error Control, Go-Back-N for SCPC or DS-CDMA Channels, Link control for variable length packet Aloha/TDM-Polling VSAT Networks.

MOBILE SATELLITE NETWORKS: Operating Environment-MSAT Network Concept-CDMA MSAT Network-Statistics of Mobile Propagation.

UNIT VI&VII

LOW EARTH ORBIT AND NON-GEOSTATIONARY SATELLITE SYSTEMS: Introduction-Orbit Considerations, Equatorial Orbits, Inclined Orbits, Elliptical Orbits, Molniya Orbit, Radiation Effects, Sun Synchronous Orbit- Coverage and Frequency Considerations, General Aspects, Frequency band, Elevation Angle Considerations, Number of Beams Per Coverage, Off-Axis Scanning, Determination of Optimum Orbital Altitude, Radiation Safety And Satellite Telephones, Projected NGSO System Customer Service Base-Delay and Throughput Considerations-System considerations, Incremental Growth, Interim Operations, Replenish Operations, End-to-End System Implementation-Operational NGSO Constellation Designs, Ellipse, Global star, New ICO, Iridium, Orbcomn, Sky bridge, Teledesic. Direct Broadcast Satellite

UNIT VIII

TELEVISION AND RADIO: C-Band and Ku-Band Home Satellite TV-Digital DBS TV- DBS-TV System Design-DBS-TV Link Budget-Error Control in Digital DBS-TV, Master Control Station and Uplink-Installation of DBS-TV Antennas-Satellite Radio Broadcasting.

TEXT BOOKS:

1. "Digital Satellite Communications", Tri T. Ha, Second Edition, McGraw-Hill Professional.
2. "Satellite Communications", Timothy Pratt, Charles Bostian, Jeremy Allnutt, Second Edition, Wiley India Edition.

REFERENCES:

1. "Satellite Communications", dennis roddy, fourth edition, Tata McGraw-hill education private limited.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR
ANANTAPUR

I Year M.Tech (CS) **L P C**
II Semester **4 – 4**

(9D61203) ADAPTIVE FILTER THEORY

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. Adaptive Filtering Primer with MATLAB- Alexander D Poularikas & zayed m Ramadan, CRC, Taylor & Francis group.
2. Optimum signal processing: An introduction - Sophocles.J.Orfamadis, 2 ed., 1988, McGraw-Hill, Newyork
3. Adaptive signal processing-Theory and Applications, S.Thomas Alexander, 1986, Springer –Verlag.

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I Year M.Tech (CS) **L P C**
II Semester **4 – 4**

(9D61204) OPTICAL FIBER COMMUNICATIONS

UNIT I

INTRODUCTION AND OPTICAL FIBER WAVEGUIDES: Historical Development, The General System, Advantages of Optical Fiber Communications, Ray Theory transmission, Electromagnetic mode theory for Optical Propagation, Cylindrical Fiber.

UNIT II

OPTICAL FIBER MODES AND CONFIGURATIONS: Single mode fibers, Fiber Materials, Photonic Crystal fibers, Fiber Fabrication, Mechanical Properties of Fibers, Fiber Optic Cables.

UNIT III

ATTENUATION: Material Absorption Losses in Silica Glass Fibers, Linear Scattering Losses, non- Linear Scattering Losses ,Fiber Bend Loss, Dispersion, Intra-modal dispersion, Intermodal dispersion, Overall fiber dispersion, Polarization.

UNIT IV

PREPARATION OF OPTICAL FIBERS: Liquid-phase techniques, Vapor- phase deposition techniques, cable design, Fiber alignment and joint loss, Fiber Splices, Fiber Connectors, Expanded beam connectors, Fiber Couplers, Optical Isolators and Circulators.

UNIT V

LIGHT EMITTING DIODES (LEDS): LED Structures, Light Source Materials, Quantum efficiency and LED Power, Modulation of LED. LASER Diodes- Laser Diode Modes and Threshold Conditions, Laser Diode Rate Equations, External Quantum Efficiencies, Resonant Frequencies, Laser characteristics.

UNIT VI

POWER LAUNCHING AND COUPLING: Source to Fiber Power Launching, Lensing Schemes for Coupling Improvement, fiber-to-fiber Joints, LED coupling tot single mode fibers, Fiber Splicing, Optical fiber connectors. Photo Detectors – Physical principles of photo diodes, photo detector noise, detector response time, avalanche multiplication noise, structures for In GaAs APDs, temperature effect on avalanche gain, comparisons of photo detectors.

UNIT VII

DIGITAL LINKS: SYSTEM ARCHITECTURES: Point to point Links, Distribution networks, local area networks, Point to point links: power penalties, error control, and Analog links: over view of analog links, carrier to noise ratio, multichannel transmission techniques, RF over fiber, radio over fiber links.

UNIT VIII

WDM CONCEPTS AND COMPONENTS: Over view, Passive optical couplers, Isolators & circulators, Fiber grating filters, dielectric thin film filters, and Phased array based devices, Diffraction gratings, Active optical components, tunable light sources.

TEXT BOOKS:

1. "Optical Fiber Communications", John M.Senior, PHI, 3rd Edition, 2010.
2. "Optical Fiber Communications", Gerd keiser, McGraw Hill International Edition, 4th Edition, 2010.
3. "Fiber-Optic Communication System", Govind P.Agarwa, 3rd edition.

REFERENCES:

1. "Principles and Applications of Optical Communications", Max Ming-Kang Liu, TMH, 2010.
2. "Text Book on Optical Fiber Communication and Its Applications", S.C.Gupta, PHI, 2005.

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I Year M.Tech (CS) **L P C**
II Semester **4 – 4**

(9D61205) RF SYSTEMS AND CIRCUITS

UNIT I

Review of Basic Transmission Line Theory, Planar Transmission Lines - Stripline, microstrip line, suspended stripline and coplanar line;

UNIT II

Parallel coupled lines in stripine and microstrip – Analysis, design and characteristics. Microwave Network Analysis - Microwave network representation, Impedance and admittance matrices, Scattering parameters, Typical two-port, three port, four port networks;

UNIT III&IV

Impedance Matching Techniques - Smith chart, Matching networks using lumped elements, Single- and double-stub matching, Quarter wave transformer, Multisection transformers -Binomial and Chebyshev. Basic Passive Components -Lumped elements in MIC, Discontinuities and resonators in microstrip, Balun. Analysis and design of stripline/microstrip components- Directional couplers, Power divider, Hybrid ring.

UNIT V

Switches and Phase Shifters - PIN diode– Equivalent circuit and Characteristics, Basic series and shunt switches in microstrip; SPST and SPDT switches, Switched line, branchline coupled and loaded line phase shifters in microstrip. Applications in phased arrays.

UNIT VI&VII

MIC Filters - Lumped element filter design at RF. Impedance and Low pass scaling, Frequency transformation, High impedance/Low impedance low pass filter, Parallel coupled band pass filter, Spur line band stop filter, Realization in microstrip and suspended stripline Basics of MIC, MMIC and MEMS technologies - Substrates used. Fabrication process. Relative advantages. Examples- Realization of lumped elements and filters in MMIC, Realization of planar transmission lines and filters in MEMS.

UNIT VIII

DETECTOR AND DEMODULATOR CIRCUITS: AM envelope detectors, Noise, Balanced demodulators, Synchronous AM demodulation, Double-Side band (DSBSC) and single,sideband(SSBSC) suppressed carrier demodulators, FM and PM demodulator circuits, Discriminator circuits, Ratio detector circuits, Pulse-counting detectors, Phase locked loop FM/PM detectors, Quadrature detector.

TEXT BOOKS:

1. "Radio Frequency And Microwave Electronics", M.M. Radmanesh, , Pearson Education Asia, 2001.
2. "Secrets of RF Circuit Design", Joseph J.Carr-Tata Mc Graw Hill, 3rd Edition.

REFERENCES:

1. *"*Stripline-Like Transmission Line For Microwave Integrated Circuits*",*B. Bhat & S.K. Koul, New Age Intl. (P) Ltd.,1989.
2. *"Radio Frequency and Microwave Communication Circuits – Analysis and Design", D. K. Misra, John Wiley & Sons, 2001.*
3. *"Microwave Engineering",D. M. Pozar, , 2nd Edition, John Wiley & Sons, 1998.*

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ANANTAPUR

I Year M.Tech (CS) **L P C**
II Semester **4 – 4**

(9D61206a) MIMO COMMUNICATION SYSTEMS
(ELECTIVE II)

UNIT I&II

INFORMATION THEORETIC ASPECTS OF MIMO: Review of SISO fading communication channels, MIMO channel models, Classical i.i.d. and extended channels, Frequency selective and correlated channel models, Capacity of MIMO channels, Ergodic and outage capacity, Capacity bounds and Influence of channel properties on the capacity.

UNIT III&IV

MIMO DIVERSITY AND SPATIAL MULTIPLEXING: Sources and types of diversity, analysis under Rayleigh fading, Diversity and channel knowledge. Alamouti space time code, MIMO spatial multiplexing. Space time receivers. ML, ZF, MMSE and Sphere decoding, BLAST receivers and Diversity multiplexing trade-off.

UNIT V&VI

SPACE TIME BLOCK CODES: Space time block codes on real and complex orthogonal designs, Code design criteria for quasi-static channels (Rank, determinant and Euclidean distance), Orthogonal designs, Generalized orthogonal designs, Quasi-orthogonal designs and Performance analysis.

UNIT VII&VIII

SPACE TIME TRELLIS CODES: Representation of STTC, shift register, generator matrix, state-transition diagram, trellis diagram, Code construction, Delay diversity as a special case of STTC and Performance analysis.

TEXT BOOKS:

1. "Fundamentals of Wireless Communication", David Tse and Pramod Viswanath, Cambridge University Press 2005.
2. "Space-Time Coding: Theory and Practice", Hamid Jafarkhani, Cambridge University Press 2005.

REFERENCES:

1. " INTRODUCTION TO SPACE-TIME WIRELESS COMMUNICATIONS", Paulraj, R. Nabar and D. Gore, Cambridge University Press 2003.

2 "SPACE-TIME BLOCK CODING FOR WIRELESS COMMUNICATIONS", 4.E.G. Larsson and P. Stoica, Cambridge University Press 2008.

3 "MIMO WIRELESS COMMUNICATIONS", Ezio Biglieri , Robert Calderbank et al Cambridge University Press 2007.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR
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I Year M.Tech (CS) **L P C**
II Semester **4 – 4**

(9D61206b) SECURE COMMUNICATION
(ELECTIVE II)

UNIT I&II

Rings and fields - Homomorphism- Euclidean domains - Principal Ideal Domains - Unique Factorization Domains -- Field extensions- Splitting fields - Divisibility- Euler theorem - Chinese Remainder Theorem - Primality.

UNIT III&IV

Basic encryption techniques - Concept of cryptanalysis - Shannon's theory - Perfect secrecy - Block ciphers - Cryptographic algorithms - Features of DES – Linear and Differential Cryptanalysis – AES - Stream ciphers - Pseudo random sequence generators – linear complexity - Non-linear combination of LFSRs - Boolean functions – Cryptanalysis of LFSR based stream ciphers.

UNIT V&VI

Private key and Public key cryptosystems - One way functions - Discrete log problem – Factorization problem - RSA encryption - Diffie Hellmann key exchange - Message authentication and hash functions -Digital signatures - Secret sharing - features of visual cryptography - other applications of cryptography.

UNIT VII&VIII

Elliptic curves - Basic theory - Weirstrass equation - Group law - Point at Infinity -Elliptic curves over finite fields - Discrete logarithm problem on EC - Elliptic curve cryptography – Integer factorization - Diffie Hellmann key exchange over EC - Elgamal encryption over EC – ECDSA.

TEXT BOOKS:

1. "Cryptography, Theory and Practice", Douglas A. Stinson, 2nd edition, Chapman & Hall, CRC Press Company, Washington.
2. " Introduction to Cryptography with Coding Theory", Wade Trappe, Lawrence C. Washington, Second edition – Pearson Education, 2006.

REFERENCES:

1. "Cryptography and Network Security", William Stallings, 4th edition, Pearson Education, 2006.
2. "Elliptic Curves", Lawrence C. Washington, Chapman & Hall, CRC Press Company, Washington.
3. " Abstract Algebra", David S. Dummit, Richard M. Foote, John Wiley & Sons
4. " Primality and Cryptography", Evangelos Kranakis, John Wiley & Sons
5. " Analysis and Design of Stream Ciphers", Rainer A. RuppelSpringer Verlag

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR
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I Year M.Tech (CS) **L P C**
II Semester **4 – 4**

(9D06205) 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
ANANTAPUR

I Year M.Tech (CS) **L P C**
II Semester **- 3 2**

(9D61207) COMMUNICATION LAB II

Course Tools*:* - Numerical Computing Environments – GNU Octave or MATLAB or any other equivalent tool and specialized tools line OPNET/NS-2 etc.

Experiment List:

1. Simulation of Rayleigh fading channel in the mobile environment.
2. Design and performance evaluation of CDMA communication system over a Gaussian channel.
3. Design and performance evaluation of CDMA communication system over a multipath Rayleigh fading channel.
4. Simulation of communication system using convolutional codes & Viterbi Decoding.
5. Design and simulation of an adaptive equalizer using LMS algorithm.
6. Design and simulation of an adaptive equalizer using RLS algorithm.
7. Design and simulation of communication system using Bussgang Blind channel equalizer.
8. Low pass filtering of a given image & Sharpening a given image.
9. Color image in various color models.

REFERENCES:

1. W.H. Tranter, K. Sam Shanmugham, T.S. Rappaport, and K.L. Kosbar, "Principles of Communication System Simulation with Wireless Applications," Pearson, 2004.
2. J.G. Proakis, and M. Salehi, "Contemporary Communication Systems using MATLAB, Bookware Companion Series, 2006.
3. Simon Haykin, "Adaptive filter theory"