G.Narayanamma Institute of Technology & Science (for women)
(Autonomous)
(With Effect from 2011-12)

DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING

ACADEMIC REGULATIONS

COURSE STRUCTURE

AND

DETAILED SYLLABUS

FOR

M. Tech. (Digital Electronics and Communication Engineering)

(with effect from 2011- 12)

G.NARAYANAMMA INSTITUTE OF TECHNOLOGY & SECIENCE

(For Women)

Autonomous

Shaikpet, Hyderabad - 500 008 AP.

G. Narayanamma Institute of Technology and Science (for women),
Autonomous
M. TECH. (DIGITAL ELECTRONICS AND COMMUNICATION ENGINEERING)

ACADEMIC REGULATIONS 2011-12 for M.Tech (Regular) Degree Course

(Effective for the Students admitted in to first year from the academic year 2011-2012)

The M.Tech Degree of Jawaharlal Nehru Technological University Hyderabad shall be conferred on candidates who are admitted to the Program and fulfill all the requirements for the award of the Degree.

ELIGIBILITY FOR ADMISSIONS:

Admission to the above subject are as per the eligibility, qualifications and specialization prescribed by the University from time to time.

Admissions shall be made on the basis of merit rank obtained by the eligible candidate at an Entrance test conducted by the University or on the basis of any other order of merit of GATE or AP-PGECET etc. approved by the University in accordance to reservations prescribed by the University from time to time.

2.0 AWARD OF M. Tech. Degree

2.1 A student shall be declared eligible for the award of the M.Tech degree, if she pursues a course of study and completes it successfully within TWO academic years but not more than four academic years from the date of registration.

2.2 Any student, who fails to fulfill all the academic requirements for the award of M.Tech degree within four academic years from the year of her admission, shall forfeit her seat in that M.Tech course.

2.3 The minimum instruction for each semester will be 90 instruction days.

3.0 A. COURSE OF STUDY:

The following specializations are offered at present FOR the M.Tech course of study.

1. Power Electronics and Electric Drives in EEE
2. Computer Science and Engineering in CSE
3. Digital Electronics and Communication Engineering in ECE

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

3.0 B. Departments offering M.Tech Programmes with specializations mentioned below:

EEE	Power Electronics and Electric Drives
ECE	Digital Electronics and Communication Engineering.
CSE	Computer Science Engineering

4.0 ATTENDANCE:

1. The programs arc offered on a unit basis with each subject being considered as one unit.
2. A candidate shall be deemed to be eligible to write end semester examinations in any subject if she has put in at least 75% of attendance in that subject.
3. Shortage of attendance up to 10% in any subject (i.e. 65% and above and below 75%) may be condoned by the College Academic Committee on genuine and valid reasons on representation by the **candidate** with supporting medical certificate from a registered doctor.
4. A candidate shall get minimum required attendance at least in three (3) theory subjects in the present semester to get promoted to the next semester. In order to qualify for the award of the **M.Tech.** Degree, the candidate shall complete all the academic requirements of the subjects, and pass as per the course structure.
5. Shortage of attendance below 65% shall **in no** case **be condoned.**
6. A stipulated fee shall be payable towards condonation of shortage of attendance.

5.0 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.

5.1 For the theory subjects 60 marks shall be awarded based on the performance in the End Semester Examination, 40 marks shall be awarded based on the Internal Evaluation. The internal evaluation shall be made based on the better of the marks secured in the two Mid Term-Examinations conducted the first mid to be conducted during 7^{th} to 9^{th} week of the Semester and the other immediately after the completion of instruction. Each mid term examination shall be conducted for duration of 120 minutes with 4 questions to be answered out of 6 questions.

5.2 For practical subjects, 60 marks shall be awarded based on the performance in the End **Semester** Examinations, 40 marks shall be awarded based on the day-to-day performance as Internal Marks.

5.3 There shall be two seminar presentations during I year I semester one seminar and the second seminar in II Semester. For seminar, a student should take guidance under the supervision of a faculty member, to collect the literature on a topic and critically review the literature and submit it to the Department in a report form and shall make an oral presentation before the Departmental Committee. The Departmental Committee consists of Head of the Department, supervisor and two other senior faculty members of the department.

For each Seminar there will be only internal evaluation of 50 marks. A candidate has to secure a minimum of 50% to be declared successful.

5.4 There shall be a Comprehensive Viva-Voce in II year I Semester. The Comprehensive Viva-Voce will be conducted by a Committee consisting of Head of the Department and two Senior Faculty members of the Department. The Comprehensive Viva-Voce is aimed to assess the students' understanding in various subjects she studies during the M.Tech course of study. The Comprehensive Viva-Voce is valued for 100 marks by the Committee. There are no internal marks for the Comprehensive viva-Voce

5.5 A candidate shall be deemed to have secured the minimum academic requirement in a subject if She 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.

5.6 In case the candidate does not secure the minimum academic requirement in any subject (as specified in (5.5) she has to reappear for the End Examination in that subject. A candidate shall be given only one chance to re-register for each subject provided the internal marks secured by a candidate are less than 50% and she has failed in the end examination. In such case candidate must re-register for the subject(s) and secure required minimum attendance. Attendance in the re-registered subject(s) has to be calculated separately to become eligible to write the end examination in the re-registered subject(s).The attendance of re-registered subject(s) shall be calculated separately to decide upon the eligibility for writing the end examination in those subject(s) as mentioned at point 4.0 attendances. In the event of taking another chance, the internal marks and end examination marks obtained in the previous attempt are nullified.

5.7 In case the candidate secures less than the required attendance in any subject(s), she shall not be permitted to appear for the End Examination in that subject(s). She shall re-register the subject when next offered.

5.8 Laboratory examination for M.Tech courses must be conducted with two Examiners, one of them being Laboratory Class Teacher and second examiner will nominated by the principle/ Director from the from the panel suggested by HOD..

6.0 EVALUATION OF PROJECT / DISSERTATION WORK:

Every candidate shall be required to submit thesis or dissertation after selecting a topic approved by the Project Review Committee.

6.1 A Project Review Committee (PRC) shall be constituted by the Principal/ Director as chair, is the convener, HOD and other HODS of M.Tech offering two other senior faculty members.

6.2 Registration of Project Work: A candidate is permitted to register for the project work after satisfying the attendance requirement of all the subjects (theory and practical subjects).

6.3 After satisfying 6.2, a candidate has to submit, in consultation with her project supervisor, the title, objective and plan of action of her project work to the Departmental Committee for its approval. Only after obtaining the approval of Departmental Committee the student can initiate the Project work.

6.4 If a candidate wishes to change her supervisor or topic of the project she can do so with approval of Departmental Committee. However, the Departmental Committee shall examine whether the change of topic/supervisor leads to a major change of her initial plans of project proposal, If so, her date of registration for the project work start; from the date of change of Supervisor or topic as the case may be.

6.5 A candidate shall submit status report (in a bound/Spiral form) in two stages at least with a gap of 3 months between them.

6.6 The work of project shall be initiated in the beginning of the second year and the duration of the project is for two semesters. A candidate is permitted to submit Project Thesis only after successful completion of theory and practical course with approval of PRC not earlier than 40 weeks from the date of registration of the project work. For the approval of PRC the candidate shall submit the draft copy of thesis to the Principal/ Director (through Head of the Department) and shall make an oral presentation before the PRC.

6.7 Three copies of the Project Thesis certified by the supervisor shall be submitted to the College / School /Institute.

6.8 The thesis shall be adjudicated by one examiner selected by the Principal/Director. For that, the head of the concerned department shall submit a panel of *5* examiners, who are eminent in that field with the help of the concerned guide.

6.9 If the report of the examiner is not favorable, the candidate shall revise and resubmit the Thesis, in the time frame as described by PRC. If the report of the examiner is unfavorable again, the thesis shall be summarily rejected.

6.10 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. The Board shall jointly report candidates work as:

A. Excellent B. Good C. Satisfactory D. Unsatisfactory

Head of the Department shall coordinate and make arrangements for the conduct of viva-voce examination. If the report of the viva-voce is unsatisfactory, the candidate will retake the viva-voce examination after three months, if she fails to get a satisfactory report at the second viva-voce examination, she will not be eligible for the award of the degree.

7.0 AWARD OF DEGREE AND CLASS:

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

Class A warded	% of marks to he secured
First Class with Distinction	70% and above
First Class	Below 70% but not less than 60%
Second Class	Below 60% but not le.ss than 50%
Pass Class	Below 50% but not less than 40%

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

8.0) WITHHOLDING OF RESULTS:

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

9.0) TRANSITORY REGULATIONS:

Candidate who have discontinued Or have been detained for want of attendance or who have failed after having undergone the course are eligible-for admission to the same or equivalent subjects as and when subjects are offered, subject to 5.5 and 2.0

10.0 GENERAL:

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

10.2 In case of any doubt or ambiguity in the interpretation of the above rules, the decision of Director is final.

10.3 The college may change or amend the academic regulations and syllabus at any time and the changes and amendments made shall be applicable to all the students with effect from the date notified by the college.

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MALPRACTICES RULES

DISCIPLINARY ACTION FOR IMPROPER CONDUCT IN EXAMINATIONS

	Nature of Malpractices/Improper	**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 she 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, she will be handed over to the police and a case is registered against her.
2.	Has copied material the examination hail 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 hail 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 Directors office.

3.	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 seal. The performance of the original candidate who has been impersonated, shall be cancelled in all the subjects of the examination (including practical's 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 imposter is an outsider, she will be handed over to the police and a case is registered against him.
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 (or 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.
5.0	Uses objectionable, abusive or offensive language in the answer paper or in letters to the examiners or writes to the examiner	Cancellation of the performance in that subject.

6.0	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 her person or to any of her 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 her relations, or indulges in any other act of misconduct or mischief which result in damage to or destruction of property in the	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 candideate(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 arc debarred and forfeit their seals. In case of outsiders, they will be handed over to the police and a police case is registered against them.
7.0	Leaves the exam hall taking away answer script or intentionally tears of the script or any pail 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.

8.	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.
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 ail 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.	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)
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.	

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COURSE STRUCTURE AND SYLLABUS

I YEAR - I Semester

Code	Group	Subject	L	P	Credits
		Digital System Design	3	0	3
		Advanced Digital Signal Processing	3	0	3
		VLSI Technology and Design	3	0	3
		Advanced Data Communications	3	0	3
	Elective -I	Detection and Estimation Theory	3	0	3
		Microcontrollers for Embedded System Design			
		Speech Processing			
	Elective -II	Internetworking	3	0	3
		Advanced Computer Architecture			
		Embedded Real Time Operating Systems			
	Lab	Signal Processing Lab	0	3	2
		Seminar	-	-	2
		Total Credits (6 Theory + 1 Lab.)			22

I YEAR - II Semester

Code	Group	Subject	L	P	Credits
		Image & Video Processing	3	0	3
		Coding Theory and techniques	3	0	3
		Optical Communications technology	3	0	3
		Wireless Communications & networks	3	0	3
	Elective –III	Low Power VLSI Design	3	0	3
		Optical networks	3	0	3
		Radar Signal Processing	3	0	3
	Elective –IV	Network Security & Cryptography	3	0	3
		Design for testability	3	0	3
		Digital Signal Processors and Architectures	3	0	3
		Advanced Communications lab	0	3	2
		Seminar	-	-	2
		Total Credits (6 Theory + Lab.)			22

II YEAR - I Semester

Code	Group	Subject	L	P	Credits
		Comprehensive Viva	-	-	2
		Project Seminar	0	3	2
		Project Work	-	-	18
		Total Credits	-	-	22

II YEAR - II Semester

Code	Group	Subject	L	P	Credits
		Project work and Seminar	-	-	22
		Total Credits	-	-	22

I Year I Sem M.Tech (DECE)

DIGITAL SYSTEM DESIGN

Unit-I: Designing with Programmable Logic Devices
Designing with Read only memories – Programmable Logic Arrays – Programmable Array logic – Sequential Programmable Logic Devices – Design with FPGA's– Using a One-hot state assignment, State transition table- State assignment for FPGA's - Problem of Initial state assignment for One – Hot encoding .

Unit-II: Fault Modeling & Test Pattern Generation
Logic Fault model – Fault detection & Redundancy- Fault equivalence and fault location –Fault dominance – Single stuck at fault model – Multiple stuck at fault models –Bridging fault model Fault diagnosis of combinational circuits by conventional methods – Path sensitization techniques, Boolean Difference method – Kohavi algorithm – Test algorithms – D algorithm, PODEM, Random testing, Transition count testing, Signature analysis and test bridging faults.

Unit-III: Fault Diagnosis in Sequential Circuits
Circuit Test Approach, Transition Check Approach - State identification and fault detection experiment, Machine identification, Design of fault detection experiment.

Unit-IV: PLA Minimization and Testing
PLA Minimization – PLA folding, Fault model in PLA, Test generation and Testable PLA Design.

Unit-V: Minimization and Transformation of Sequential Machines
The Finite state Model –Capabilities and limitations of FSM– State equivalence and machine minimization – Simplification of incompletely specified machines.
Fundamental mode model – Flow table – State reduction – Minimal closed covers – Races, Cycles and Hazards.

TEXT BOOKS:
1. Fundamentals of Logic Design – Charles H. Roth, 5th ed., Cengage Learning.
2. Digital Systems Testing and Testable Design – Miron Abramovici, Melvin A. Breuer and Arthur D. Friedman- John Wiley & Sons Inc.
3. Logic Design Theory – N. N. Biswas, PHI

REFERENCES:
1. Switching and Finite Automata Theory – Z. Kohavi , 2nd ed., 2001, TMH
2. Digital Design – Morris Mano, M.D.Ciletti, 4th Edition, PHI.
3. Digital Circuits and Logic Design – Samuel C. Lee , PHI

I Year -I Sem M.Tech. (DECE)

ADVANCED DIGITAL SIGNAL PROCESSING

UNIT I

Review of DFT, FFT, IIR Filters, FIR Filters,

Multirate Signal Processing: Introduction, Decimation by a factor D, Interpolation by a factor I, Sampling rate conversion by a rational factor I/D, Multistage Implementation of Sampling Rate Conversion, Filter design & Implementation for sampling rate conversion, Applications of Multirate Signal Processing

UNIT II

Non-Parametric methods of Power Spectral Estimation: Estimation of spectra from finite duration observation of signals, Non-parametric Methods: Bartlett, Welch & Blackman & Tukey methods, Comparison of all Non-Parametric methods

UNIT III

Parametric Methods of Power Spectrum Estimation: Autocorrelation & Its Properties, Relation between auto correlation & model parameters, AR Models - Yule-Waker & Burg Methods, MA & ARMA models for power spectrum estimation.

UNIT –IV

Linear Prediction : Forward and Backward Linear Prediction – Forward Linear Prediction, Backward Linear Prediction, Optimum reflection coefficients for the Lattice Forward and Backward Predictors. Solution of the Normal Equations: Levinson Durbin Algorithm, Schur Algorithm. Properties of Linear Prediction Filters

UNIT V

Finite Word Length Effects: Analysis of finite word length 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.

TEXTBOOKS:

1. Digital Signal Processing: Principles, Algorithms & Applications - J.G.Proakis & D.G.Manolokis, 4th ed., PHI.
2. Discrete Time signal processing - Alan V Oppenheim & Ronald W Schaffer, PHI.
3. DSP – A Pratical Approach – Emmanuel C.Ifeacher, Barrie. W. Jervis, 2 ed., Pearson Education.

REFERENCES:

1. Modern spectral Estimation : Theory & Application – S. M .Kay, 1988, PHI.
2. Multirate Systems and Filter Banks – P.P.Vaidyanathan – Pearson Education
3. Digital Signal Processing – S.Salivahanan, A.Vallavaraj, C.Gnanapriya, 2000,TMH

I Year -I Sem M.Tech. (DECE)

VLSI TECHNOLOGY & DESIGN

UNIT – I:
Review of Microelectronics and Introduction to MOS Technologies: MOS, CMOS, BiCMOS Technology, Trends And Projections.
Basic Electrical Properties of MOS, CMOS & BiCMOS Circuits: I_{ds}-V_{ds} relationships, Threshold Voltage V_t, G_m, G_{ds} and ω_o, Pass Transistor, MOS, CMOS & Bi CMOS Inverters, Zpu/Zpd, MOS Transistor circuit model, Latch-up in CMOS circuits.

UNIT – II:
Layout Design And Tools: Transistor structures, Wires and Vias, Scalable Design rules, Layout Design tools.
Logic Gates & Layouts: Static Complementary Gates, Switch Logic, Alternative Gate circuits, Low power gates, Resistive and Inductive interconnect delays.

UNIT – III:
Combinational Logic Networks: Layouts, Simulation, Network delay, Interconnect design, Power optimization, Switch logic networks, Gate and Network testing.

UNIT –IV:
Sequential Systems: Memory cells and Arrays, Clocking disciplines, Design, Power optimization, Design validation and testing.

UNIT – V:
Floor Planning & Architecture Design: Floor planning methods, off-chip connections, High-level synthesis, Architecture for low power, SOCs and Embedded CPUs, Architecture testing.

TEXT BOOKS:
1. Essentials of VLSI Circuits and Systems, K. Eshraghian Eshraghian. D, A.Pucknell, 2005, PHI.
2. Modern VLSI Design - Wayne Wolf, 3rd ed., 1997, Pearson Education.

REFERENCES:
1. Principals of CMOS VLSI Design – N.H.E Weste, K.Eshraghian, 2nd ed., Adisson Wesley.

I Year -I Sem M.Tech. (DECE)

ADVANCED DATA COMMUNICATIONS

Unit-I:

Digital Modulation*:* Introduction, Information Capacity Bits, Bit Rate, Baud, and M-ARY Coding, ASK, FSK, PSK, QAM, BPSK, QPSK, 8PSK, 16PSK, 8QAM, 16QAM, DPSK – Methods, Band Width Efficiency, Carrier Recovery, Clock Recovery.

Unit -II:

Basic Concepts of Data Communications, Interfaces and Modems: Data Communication- Components, Networks, Distributed Processing, Network Criteria- Applications, Protocols and Standards, Standards Organizations- Regulatory Agencies, Line Configuration- Point-to-point- Multipoint, Topology- Mesh- Star- Tree- Bus- Ring- Hybrid Topologies, Transmission Modes- Simplex- Half duplex- Full Duplex, Categories of Networks- LAN, MAN, WAN and Internetworking, Digital Data Transmission- Parallel and Serial, DTE- DCE Interface- Data Terminal Equipment, Data Circuit- Terminating Equipment, Standards EIA 232 Interface, Other Interface Standards, Modems- Transmission Rates.

Unit-III:

Error Detection and Correction*:* Types of Errors- Single- Bit Error, CRC (Cyclic Redundancy Check)- Performance, Checksum, Error Correction- Single-Bit Error Correction, Hamming Code.
Data link Control: Stop and Wait, Sliding Window Protocols.
Data Link Protocols: Asynchronous Protocols, Synchronous Protocols, Character Oriented Protocol- Binary Synchronous Communication (BSC) - BSC Frames- Data Transparency, Bit Oriented Protocols – HDLC, Link Access Protocols.

Unit-IV:

Switching: Circuit Switching- Space Division Switches- Time Division Switches- TDM Bus- Space and Time Division Switching Combinations- Public Switched Telephone Network, Packet Switching- Datagram Approach- Virtual Circuit Approach- Circuit Switched Connection Versus Virtual Circuit Connection, Message Switching.

Multiplexing: Time Division Multiplexing (TDM), Synchronous Time Division Multiplexing, Digital Hierarchy, Statistical Time Division Multiplexing.

Unit-V:

Multiple Access*:* Random Access, Aloha- Carrier Sense Multiple Access (CSMA)- Carrier Sense Multiple Access with Collision Detection (CSMA)- Carrier Sense Multiple Access with Collision Avoidance (CSMA/CA), Controlled Access- Reservation- Polling- Token Passing, Channelization- Frequency- Division Multiple Access (FDMA), Time - Division Multiple Access (TDMA), - Code - Division Multiple Access (CDMA).

TEXT BOOKS:

1. Data Communication and Computer Networking - B. A.Forouzan, 3rd ed., 2008, TMH.
2. Advanced Electronic Communication Systems - W. Tomasi, 5 ed., 2008, PEI.

REFERENCES:

1. Data Communications and Computer Networks - Prakash C. Gupta, 2006, PHI.
2. Data and Computer Communications - William Stallings, 8th ed., 2007, PHI.
3. Data Communication and Tele Processing Systems - T. Housely, 2nd Edition, 2008, BSP.
4. Data Communications and Computer Networks- Brijendra Singh, 2nd ed., 2005, PHI.
5. Telecommunication System Engineering – Roger L. Freeman, 4/ed., Wiley-Interscience, John Wiley & Sons, 2004.

I Year -I Sem M.Tech. (DECE)

DETECTION & ESTIMATION THEORY
(ELECTIVE –I)

Unit – I

Introduction, Simple Binary Hypothesis Tests, M-Hypothesis, Estimation Theory, Composite Hypothesis, General Gaussian Problem, Performance Bounds and Approximations, Sampling of Bandlimited Random Signals, Periodic random Processes, Spectral Decomposition, Vector Random Processes.

Unit – II

Detection & Estimation of Signals in White Gaussian Noise and Non-White Gaussian Noise, Signals with unwanted Parameters, Multiple Channels and Multiple Parameter, Linear & Non-Linear estimates, MLP & ML Estimates, Maximum Likelihood Estimate of Parameters of Linear Systems

Unit – III

Minimum Probability Error Criterion, Neyman-Pearson Criterion for Radar detection of Constant and variable amplitude signals, Matched Filters, Optimum formulation, Detection of Random Signals, Simple Problems there on with Multisample cases.

Unit – IV

Estimation of Continuous Waveforms: Derivation of Estimator Equations, A Lower Bound on the Mean Square Estimation Error, Multi dimensional Waveform Estimation, Nonrandom Waveform estimation.

Unit – V

Estimation of Time varying Signals – Kalman Filtering, Filtering Signals in Noise treatment, Restricted to two variable case only- simple Problems, Realizable Linear Filters, Kalman Bucy Filters, Fundamental role of Optimum Linear Filters.

TEXT BOOKS:

1. Detection, Estimation and Modulation Theory: Part – I – Harry L. Van Trees, 2001, John Wiley & Sons, USA.
2. Signal Processing : Discrete Spectral Analysis – Detection & Estimation – Mischa Schwartz, Leonard Shaw, 1975, McGrawHill.

REFERENCES :

1. Fundamentals of Statistical Signal Processing: Volume I Estimation Theory– Steven.M.Kay, Prentice Hall, USA, 1998.
2. Fundamentals of Statistical Signal Processing: Volume I Detection Theory– Steven.M.Kay, Prentice Hall, USA, 1998.
3. Introduction to Statistical Signal Processing with Applications - Srinath, Rajasekaran, Viswanathan, 2003, PHI.
4. Statistical Signal Processing: Detection, Estimation and Time Series Analysis – Louis L.Scharf, 1991, Addison Wesley.
5. Random Signals : Detection, Estimation and Data Analysis – K.Sam Shanmugam, Arthur M Breiphol, 1998, John Wiley & Sons.

I Year -I Sem M.Tech. (DECE)

MICROCONTROLLERS FOR EMBEDDED SYSTEM DESIGN (ELECTIVE –I)

Unit – I: Introduction to Embedded Systems

Overview of Embedded Systems, Processor Embedded into a system, Embedded Hardware Units and Devices in system, Embedded Software, Complex System Design, Design Process in Embedded System, Formalization of System Design, Classification of Embedded Systems.

Unit – II: Microcontrollers and Processor Architecture & Interfacing

8051 Architecture, Input/Output Ports and Circuits, External Memory, Counters and Timers, AVR MicroControllers. Interfacing Processor (8051, AVR, Memory Interfacing, I/O Devices, Development environments for 8051,AVR family

Unit – III: Embedded RISC Processors & Embedded System-on Chip Processor

PSOC (Programmable System-on-Chip **CYPRESS**) architectures, Continuous Timer blocks, Switched Capacitor blocks, I/O blocks, Digital blocks, Programming of PSOC,**PSOC Creator**, Embedded RISC Processor architecture – ARM Processor architecture, Register Set, Modes of operation and overview of Instructions

Unit – IV: Interrupts & Device Drivers

Exceptions and Interrupt handling Schemes – Context & Periods for Context Switching, Deadline & interrupt latency. Device driver using Interrupt Service Routine, Serial port Device Driver, Device drivers for Internal Programmable timing devices

Unit – V: Network Protocols

Serial communication protocols, Ethernet Protocol, SDMA, Channel & IDMA, External Bus Interface

TEXT BOOKS:

1. Embedded Systems - Architecture Programming and Design – Raj Kamal, 2nd ed., 2008, TMH.
2. AVR Microcontrollers –Dhananjay Gadre
3. Designers Guide to the Cypress PSOC – Robert Ashpy, 2005, Elsevier.

REFERENCES:

1. Embedded Microcomputer Systems, Real Time Interfacing – Jonathan W. Valvano – Brookes / Cole, 1999, Thomas Learning.
2. ARM Systems Developers Guides- Design & Optimizing System Software - Andrew N. Sloss, Dominic Symes, Chris Wright, 2004, Elsevier.
3. Embedded Systems Engineering- C R Sarma, Universities Press-2011

I Year -I Sem M.Tech. (DECE)

SPEECH PROCESSING
(ELECTIVE –I)

UNIT – I Fundamentals of Digital Speech Processing:
Anatomy & Physiology of Speech Organs, The process of Speech Production, The Acoustic Theory of Speech Production, **Loss less tube models**, Digital models for speech signals.

UNIT – II Time Domain Models for Speech Processing
Introduction- Window considerations, Short time energy and average magnitude Short time average zero crossing rate ,Speech vs. silence discrimination using energy and zero crossing, Pitch period estimation using a parallel processing approach, The short time autocorrelation function, The short time average magnitude difference function, Pitch period estimation using the autocorrelation function.

UNIT – III Linear predictive coding (LPC) analysis
Basic principles of Linear Predictive Analysis:The Autocorrelation Method, The Covariance Method, Solution of Lpc Equations: Cholesky Decomposition Solution for Covariance Method, Durbin's Recursive Solution for the Auto Correlation Equations, Comparision between the Methods of Solution of the LPC Analysis Equations, Applications of LPC Parameters: Pitch Detection using LPC Parameters, Formant Analysis using LPC Parameters.
Homomorphic Speech Processing
Introduction, Homomorphic Systems for Convolution: Properties of the Complex Cepstrum, Computational Considerations,The Complex Cepstrum of Speech, Pitch Detection, Formant Estimation, The Homomorphic Vocoder.

UNIT – IV Speech enhancement:
Nature of interfering sounds, Speech enhancment techniques: Single Microphone Approach : spectral substraction, Wiener filter, Multimicrophone Approach, **Spectral restoration: MMSE-STSA,MMSE-LSA**.
Automatic speech recognition-
Basic pattern recognition approaches, Parametric represention of speech, Evaluating the similarity of speech patterns, **Accomdating both spectral and temporal variability**, Speech Recognition Systems: Isolated Digit Recognition System,. Contineous digit Recognition System

UNIT – V Hidden Markov Model (HMM) for Speech
Hidden markov model (HMM) for speech recognition, Viterbi algorithm, Training and testing using HMMS, Adapting to variability in speech(DTW), Language models.
Speaker recognition
Recognition techniques, Features that distinguish speakers, Speaker Recognition Systems: Speaker Verification System , Speaker Identification System.

TEXT BOOKS:
1. Digital processing of speech signals - L.R Rabiner and S.W.Schafer. Pearson Education.
2. Speech Communications : Human & Machine - Douglas O'Shaughnessy, 2nd ed., IEEE Press.
3. Digital processing of speech signals. L.R Rabinar and R W Schafer,1978, PHI.
4. Foundamental of speech recognition:L.R Rabinar,Biing-Hwang Jung, Pearson Education.
5. Speech processing by J.Benesty,S.Makino,J,Chen.,Springer.

REFERENCES:

1.Discrete Time Speech Signal Processing : principles and Practice - Thomas F. Quateri 1 ed., PE.
2. Speech & Audio Signal Processing- Ben Gold & Nelson Morgan, 1 ed., Wiley.

I Year -I Sem M.Tech. (DECE)

INTERNETWORKING
(ELECTIVE –II)

Unit -I:

Internetworking concepts: Principles of Internetworking, Connectionless Internetworking, Application level Interconnections, Network level Interconnection, Properties of thee Internet, Internet Architecture, Wired LANS, Wireless LANs, Point-to-Point WANs, Switched WANs, Connecting Devices, TCP/IP Protocol Suite.
IP Address: Classful Addressing*:* Introduction, Classful Addressing, Other Issues, Sub-netting and Super-netting
IP Address*:* Classless Addressing: - Variable length Blocks, Sub-netting, Address Allocation. Delivery, Forwarding, and Routing of IP Packets: Delivery, Forwarding, Routing, Structure of Router.
ARP and RARP: ARP, ARP Package, RARP.

Unit -II:
Internet Protocol *(IP):* Datagram, Fragmentation, Options, Checksum, IP V.6.
Transmission Control Protocol (TCP*):* TCP Services, TCP Features, Segment, A TCP Connection, State Transition Diagram, Flow Control, Error Control, Congestion Control, TCP Times.
Stream Control Transmission Protocol (SCTP): SCTP Services, SCTP Features, Packet Format, Flow Control, Error Control, Congestion Control.
Mobile IP: Addressing, Agents, Three Phases, Inefficiency in Mobile IP.
Classical TCP Improvements: Indirect TCP, Snooping TCP, Mobile TCP, Fast Retransmit/ Fast Recovery, Transmission/ Time Out Freezing, Selective Retransmission, Transaction Oriented TCP.

Unit -III:
Unicast Routing Protocols (RIP, OSPF, and BGP: Intra and Inter-domain Routing, Distance Vector Routing, RIP, Link State Routing, OSPF, Path Vector Routing, BGP.
Multicasting and Multicast Routing Protocols: Unicast - Multicast- Broadcast, Multicast Applications, Multicast Routing, Multicast Link State Routing: MOSPF, Multicast Distance Vector: DVMRP.

Unit -IV:
Domain Name System (DNS): Name Space, Domain Name Space, Distribution of Name Space, and DNS in the internet.
Remote Login TELNET:- Concept, Network Virtual Terminal (NVT). ***File Transfer FTP and TFTP:*** File Transfer Protocol (FTP). ***Electronic Mail:*** SMTP and POP.
Network Management-SNMP: Concept, Management Components. World Wide Web- HTTP Architecture.

Unit-V:
Multimedia: Digitizing Audio and Video, Network security, security in the internet firewalls. Audio and Video Compression, Streaming Stored Audio/Video, Streaming Live Audio/Video, Real-Time Interactive Audio/Video, RTP, RTCP, Voice Over IP. Network Security, Security in the Internet, Firewalls.

TEXT BOOKS:
1. TCP/IP Protocol Suite- Behrouz A. Forouzan, Third Edition, TMH

2. Internetworking with TCP/IP Comer 3 rd edition PHI

REFERENCES:

1. High performance TCP/IP Networking- Mahbub Hassan, Raj Jain, PHI, 2005
2. Data Communications & Networking – B.A. Forouzan – 2nd Edition – TMH
3. High Speed Networks and Internets- William Stallings, Pearson Education, 2002.
4. Data and Computer Communications, William Stallings, 7th Edition., PEI.

I Year -I Sem M.Tech. (DECE)

ADVANCED COMPUTER ARCHITECTURE

UNIT I

Concept of instruction format and instruction set of a computer, types of operands and operations; addressing modes; processor organization, register organization and stack organization; instruction cycle; basic details of Pentium processor and power PC processor, RISC and CISC instruction set.

UNIT II

Memory devices; Semiconductor and ferrite core memory, main memory, cache memory, associative memory organization; concept of virtual memory; memory organization and mapping; partitioning, demand paging, segmentation; magnetic disk organization, introduction to magnetic tape and CDROM.

UNIT III

IO Devices, Programmed IO, interrupt driver IO, DMA IO modules, IO addressing; IO channel, IO Processor, DOT matrix printer, ink jet printer, laser printer.

Advanced concepts; Horizontal and vertical instruction format, microprogramming, microinstruction sequencing and control; instruction pipeline; parallel processing; problems in parallel processing; data hazard, control hazard.

UNIT IV

ILP software approach-complier techniques-static branch protection-VLIW approach-H.W support for more ILP at compile time-H.W verses S.W solutions

Multiprocessors and thread level parallelism-symmetric shared memory architectures-distributed shared memory-Synchronization-multi threading.

UNIT V

Storage System-Types-Buses-RAID-errors and failures-bench marking a storage device designing a I/O system.

Inter connection networks and clusters-interconnection network media – practical issues in interconnecting networks-examples-clusters-designing a cluster

Text Books:

1. "Computer organization and architecture", Williams Stallings, PHI of India, 1998.
2. Computer organization, Carl Hamachar, Zvonko Vranesic and Safwat Zaky, McGraw Hill International Edition.
3. Computer Architecture & Organization, John P. Hayes, TMH III Edition.
4. Computer Architecture A quantitative approach 3rd edition John L. Hannessy & David A. Patteson Morgan Kufmann (An Imprint of Elsevier)

Reference Books:

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

I Year -I Sem M.Tech. (DECE)

EMBEDDED REAL TIME OPERATING SYSTEMS (ELECTIVE-II)

Unit – I: Introduction

Introduction to UNIX, Overview of Commands, File I/O,(open, create, close, lseek, read, write), Process Control (fork, vfork, exit, wait, waitpid, exec), Signals, Interprocess communication,(pipes, fifos, message queues, semaphores, shared memory)

Unit II: Real Time Systems:

Typical real time applications, Hard Vs Soft real-time systems, A reference model of Real Time Systems: Processors and Resources, Temporal Parameters of real Time Work load, Periodic task model precedence constraints and data dependency, functional parameters, Resource Parameters of jobs and parameters of resources.

Unit III: Scheduling & Inter-process Communication

Commonly used Approaches to Real Time Scheduling Clock Driven, Weighted Round Robin, Priority Driven, Dynamic Vs State Systems, Effective release time and Dead lines, Offline Vs Online Scheduling.

Inter-process Communication and Synchronization of Processes, Tasks and Threads- Multiple Process in an Application, Problem of Sharing data by multiple tasks & routines, Inter-process communication

Unit IV: Real Time Operating Systems & Programming Tools

Operating Systems Services, I/O Subsystems, RT & Embedded Systems OS, Interrupt Routine in RTOS Environment

Micro C/OS-II- Need of a well Tested & Debugged RTOs, Use of μCOS-II

Unit V: VX Works & Case Studies

Memory managements task state transition diagram, pre-emptive priority, Scheduling context switches- semaphore- Binary mutex, counting watch dugs, I/O system

Case Studies of programming with RTOS- Case Study of Automatic Chocolate Vending m/c using μCOS RTOS, case study of sending application Layer byte Streams on a TCP/IP network, Case Study of an Embedded System for a smart card.

TEXT BOOKS:

1. Embedded Systems- Architecture, Programming and Design by Rajkamal, 2nd ed., 2008,TMH.
2. Real Time Systems- Jane W. S. Liu- PHI.
3. Real Time Systems- C.M.Krishna, KANG G. Shin, 1996, TMH

REFERENCES:

1. Advanced UNIX Programming, Richard Stevens
2. VX Works Programmers Guide

I Year -I Sem M.Tech. (DECE)

SIGNAL PROCESSING LAB

Note:

A. Minimum of 10 Experiments have to be conducted
B. All Experiments may be Simulated using MATLAB and to be verified theoretically.

1. Basic Operations on Signals, Generation of Various Signals and finding its FFT.
2. Program to verify Decimation and Interpolation of a given Sequences.
3. Program to Convert CD data into DVD data
4. Generation of Dual Tone Multiple Frequency (DTMF) Signals
5. Plot the Periodogram of a Noisy Signal and estimate Psd using Periodogram and Modified Periodogram methods
6. Estimation of Power Spectrum using Bartlett and Welch methods
7. Estimation of Power Spectrum using Blackman-Tukey Method
8. Verification of Autocorrelation Theorem
9. Parametric methods (Yule-Walker and Burg) of Power Spectrum Estimation
10. Estimation of data series using Nth order Forward Predictor and comparing to the Original Signal
11. Design of LPC filter using Levinson-Durbin Algorithm
12. Computation of Reflection Coefficients using Schur Algorithm

I Year -II Sem M.Tech. (DECE)

IMAGE & VIDEO PROCESSING

UNIT I Fundamentals of Image Processing and Image Transforms
Basic steps of Image Processing System Sampling and Quantization of an image – Basic relationship between pixels
Image Transforms: 2 D- Discrete Fourier Transform, Discrete Cosine Transform (DCT), Wavelet Transforms: Continuous Wavelet Transform, Discrete Wavelet Transforms.

UNIT II Image Pre Processing Techniques
Image Enhancement
Spatial domain methods: Histogram processing, Fundamentals of Spatial filtering, Smoothing spatial filters, Sharpening spatial filters.
Frequency domain methods: Basics of filtering in frequency domain, image smoothing, image sharpening, Selective filtering.
Image Segmentation
Segmentation concepts, Point, Line and Edge Detection, Thresholding, Region Based segmentation.

Image Compression:
Image compression fundamentals - Coding Redundancy, Spatial and Temporal redundancy, Compression models: Lossy & Lossless, Huffman coding, Arithmetic coding, LZW coding, Run length coding, Bit plane coding, Transform coding, Predictive coding, Wavelet coding, JPEG Standards.

UNIT III Color Image Processing
Pseudo color image processing, full color image processing

UNIT IV Basic steps of Video Processing
Analog Video, Digital Video. Time-Varying Image Formation models: Three-Dimensional Motion Models, Geometric Image Formation, Photometric Image Formation, Sampling of Video signals, Filtering operations.

UNIT V 2-D Motion Estimation
Optical flow, General Methodologies, Pixel Based Motion Esimation, Block- Matching Algorithm, Mesh based Motion Estimation, Global Motion Estimation, Region based Motion Estimation, Multi resolution motion estimation, Application of 2D motion estimation.

TEXTBOOKS
1. Digital Image Processing – Gonzaleze and Woods, 3rd ed., Pearson.
2. Video processing and communication – Yao Wang, Joem Ostermann and Ya–quin Zhang. 1st Ed., PH Int.

REFERENCES :
1. Digital Video Processing – M. Tekalp, Prentice Hall International

I Year -II Sem M.Tech. (DECE)

CODING THEORY AND TECHNIQUES

UNIT I: Linear Block & Cyclic Codes

Linear block codes: Block diagram of Digital System, Introduction to Linear Block codes, Standard Array, Syndrome decoding, Probability of undetected error, Hamming codes.

Cyclic codes: Description of cyclic codes, Generator and parity check matrices, Encoding,Syndrome computation, Error detection, Decoding,Cyclic hamming codes, Error trapping decoding, Majority logic decoding

UNIT-II : Convolutional codes

Introduction to convolution codes, Encoding, Structural and Distance properties, Maximum likelihood decoding, Sequential decoding, Majority logic decoding,Viterbi decoding, Applications of Viterbi and sequential decoding, Applications of Convolution codes in ARQ systems

UNIT-III: Burst Error Correcting Codes

Introduction to Burst Error Correcting Codes, Decoding of single Burst Error Correcting cyclic codes, Single Burst error correcting cyclic codes, Burst error correcting convolution codes, Bounds on burst error correcting capability, Interleaved cyclic codes, Interleaved convolution codes, Phased burst error correcting cyclic codes ,Phased burst error correcting convolution codes

UNIT-IV: BCH Codes

Introduction to BCH codes**,** Minimum distance and bounds on BCH codes**,** Decoding procedure for BCH codes, Syndrome computation and iterative algorithm, Error location polynomials ,Numbers for single and double error correction

UNIT-V TURBO & LDPC CODES

Turbo codes: Turbo coding, Decoding, BCJR Algorithm

LDPC Codes: Construction of LDPC Codes, Probabilistic coding, irregular codes

Proposed text book: Simon Haykin, ”communication systems”(page no.674 to 692),4th edition, wiley publications,2004

I Year II Sem M.Tech, (DECE)

OPTICAL COMMUNICATION

Unit –I

Signal Propagation in Optical Fibers

Geometrical Optics approach and Wave Theory approach, Loss and Bandwith Chromatic Dispersion, Non Linear effects. Stimulated brillouin and Stimulated Raman Scattering. Propagation in a Non -1 inear Medium self phase Modulation and Cross phase Modulation. Four Wave Mixing Principle of Solutions

UNIT-II

Overview of optical fiber communications:

Couplers, Isolators and Circulators, Multiplexers, Bragg Gratings, Fabry-Perot Filters, Mach Zender Interferometers, Arrayed Waveguide Grating. Tunable Filters. High channel Multiplexer Architectures. Optical Amplifiers. Direct and External Modulation Transmitters. Pump Sources for Amplifiers. Optical Switches and Wavelength Converters

UNIT-III

Modulation and Demodulation

Signal formats for Modulation. Subcarrier Modulation and Multiplexing, Optical Modulations –duo binary, Single side band and multilevel Schemes, Principles of photo diodes, photo detector noise, Fundamental receiver operation, Reed-Solomon Codes for Error Detection and Correction.

UNIT-IV

Transmission System Engineering

System Model power penalty in Transmitter and Receiver. Optical Amplifiers, Crosstalk and Reduction of Crosstalk. Cascaded Filters. Dispersion Limitations and Compensation Techniques.

UNIT-V

Basics of Networks, Operation principles of WDM, SONET/SDH : Transmission formats and speeds, rings, networks, Nonlinear effects on network performance.

Text Books:

1. Optical Networks: A Practical Perspective- Rajiv Ramaswami and Kumar N. Sivarajan, 2ed., 2004 Elsevier Morgan Kaufmann Publishers(An Imprint of Elseviers).
2. Optical Fiber Communications-Gerd Keiser, 3ed., 2000, McGraw Hill.

Reference:

1. Fiber Optics Communications – Principles and Practice- John.M.Senior, 2ed.,2000,PE
2. Fiber Optics Communication-Harold Kolimbris, 2ed.,2004, PEI
3. Optical Networks: Third Generation Transport Systems- Uyless Black, 2ed, 2009, PEI
4. Optical Fiber communication – Govind Agarwal, 2ed., 2004, TNH
5. Optical Fiber Communocations and Its Applications-S.C.Gupta, 2004, PHI

I Year II Sem M.Tech, (DECE)

WIRELESS COMMUNCIATIONS AND NETWORKS

Unit No I

Wireless Communications Systems & fundamentals:

Introduction to Wireless Communications Systems, examples, comparisons & trends, Cellular concepts -frequency reuse, strategies, Interference & System capacity, Trucking & grade of service, Improving coverage & capacity in Cellular Systems.

Unit No II

Multiple access techniques for Wireless Communication:

FDMA, TDMA, SSMA, (FHMA/CDMA / Hybrid techniques), SDMA technique (as applicable to Wireless Communications), Packet radio access-protocols, CSMA protocols, Reservation protocols, Capture effect in packet radio, Capacity of Cellular Systems.

Unit No III

Wireless Networking: Introduction, differences in wireless & fixed telephone networks, Traffic routing in Wireless Networks, Circuit switching, Packet switching, X.25 protocol,

Wireless & Mobile data services: Cellular Digital Packet Data (CDPD), **Data oriented CDPD Network** advanced radio data information systems, RAM Mobile Data (RMD), Common Channel Signaling (CCS), Signaling System no.7 (SS7)-protocols, ISDN, Broad band ISDN and ATM Network services part, user part, Signaling traffic, services & performance. **GPRS and higher data rates, Short Messaging Service in GSM, Mobile application protocol.**

Unit No IV

Mobile IP and Wireless Application Protocol: Mobile IP operation of mobile IP, Co-located address, Registration, Tunneling, WAP Architecture, overview, WML scripts, WAP service, WAP session protocol, Wireless transaction, Wireless datagram protocol.

Unit No V

Wireless LAN: Infrared LANs, Spread spectrum LANs, Narrow bank microwave LANs, IEEE 802 protocol Architecture, IEEE802 architecture and services, 802.11 medium access control, 802.11 Physical layer.

Adhoc Wireless Networks- Cellular and Adhoc Wireless Networks, Applications, MAC protocols, Routing, Multicasting, Transport layer protocols, Quality of service browsing, Adhoc Wireless Internet

Text books

1. Wireless Communication and Networking - Williams Stallings, 2003 PHI.
2. Wireless Communication, Principles- Theodore, S Rappaport 2nd Edn, 2002, PHI
3. Principles of Wireless Networks – KavehPah Laven and P.KrishnaMurthy, 2002, PE

Reference books:

1. Wireless Digital Communications - Kamilo Fecher, 1990, PHI.
2. Telecommunication System Engineering – Roger I.Freeman, 4/ed, Wiley-Interscience, Jhon Wiley & Sons, 2004

I Year II Sem M.Tech, (DECE)

LOW POWER VLSI DESIGN
(ELECTIVE III)

UNIT I

Low Power Design, An Over View: Introduction to low- voltage low power design,limitations, Silicon-on-Insulator.

Mos/Bicmos Processes : Bi CMOS processes, Integration and Isolation considerations,Integrated Analog/Digital CMOS Process.

UNIT II

Low-Voltage/Low Power CMOS/ BICMOS Processes: Deep submicron processes,SOI CMOS, lateral BJT on SOI, future trends and directions of CMOS/BiCMOS processes

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UNIT III

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 IV

Cmos And Bi-Cmos Logic Gates: Conventional CMOS and BiCMOS logic gates. Performance evaluation

Low- Voltage Low Power Logic Circuits: Comparison of advanced BiCMOS Digital circuits. ESD-free Bi CMOS, Digital circuit operation and comparative Evaluation.

UNIT V

Low Power Latches And Flip Flops: Evolution of Latches and Flip flops-quality measures for latches and Flip flops, Design perspective.

TEXT BOOKS

1. CMOS/BiCMOS ULSI low voltage, low power by Yeo Rofail/ Gohl(3 Authors)-Pearson Education Asia 1st Indian reprint,2002

REFERENCES

1. Digital Integrated circuits , J.Rabaey PH. N.J 1996
2. CMOS Digital ICs sung-moKang and yusuf leblebici 3rd edition TMH2003(chapter 11)
3. VLSI DSP systems , Parhi, John Wiley & sons, 2003 (chapter 17)
4. IEEE Trans Electron Devices, IEEE J.Solid State Circuits, and other National and International Conferences and Symposia.

I Year II Sem M.Tech, (DECE)

Optical Networks
(ELECTIVE III)

Unit-I Client Layers of Optical Networks
SNET / SDH- Multiplexing, Frame structure , Physical Layer, Infrastructure, ATM- Functions, Adaptations layers , QoS, Flow Control Signaling and Routing, IP Routing, QoS, MPLS, Storages Area Networks-ESCON Fiber channel. HIPPI, Gigabit Ethernet.

UNIT-II WDM network Elements and Design
Optical Line terminals and Amplifiers, Add / Drop Multiplexers, Optical Cross Connects, Cost Trade-offs in Network Design LTD and RWA Problems, Dimensioning- Wavelength Networks, Statistical and Maximum Load Dimensioning Models

Unit- III Network Control and Management
Network management Functions, Optical Layer Services and Interfacing, Layers within Optical Layer, Multivendor Interoperability, Performance and Fault Management, Configuration management, Optical Safety.

UNIT-IV Network Survivability
Basic Concepts of Survivability, Protection in SONET / SDH Links and Rings, protection in IP Networks, Optical Layer Protection- Service Classes, Protection Schemes, Interworking between Layers.

Unit –V Access Networks and Photonic Packet Switching
Networking Architecture, Enhanced HFC, FTC, Photonic Packet Switching- OTDm, Synchronization, Header Processing, Buffering, Burst Switching, Test Beds.

Text Books:

1. Optical Networks: A Practical Perspective- Rajiv Ramaswami and Kumar N. Sivarajan, 2ed., 2004 Elsevier Morgan Kaufmann Publishers(An Imprint of Elseviers).
2. WDM Optical Networks: Concepts Design and Algorithms-C Siva Rama Murthy and Mohan Guruswamy 2ed,. 2003, PEI
3. Optical Networks: Third Generation Transport Systems – Uyless Black, 2ed., 2009, PEI

Reference:

1. Optics Fiber Communications – Principles and Practice- John.M.Senior, 2ed.,2000,PE
2. Fiber Optics Communication-Harold Kolimbris, 2ed.,2004, PEI
3. Networks – Timothy S. Ramteke, 2ed.,2004, PEI
4. Optical Fiber communication – Govind Agarwal, 2ed., 2004, TNH
5. Optical Fiber Communocations and Its Applications-S.C.Gupta, 2004, PHI
6. Telecommunication System Engineering-Roger L.Freeman, 4/ed., Wiley-Interscience, John Wiley & Sons,2004

I Year II Sem M.Tech, (DECE)

RADAR SIGNAL PROCESSING
(ELECTIVE III)

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.

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 II

Detection of Radar Signals in Noise - 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 III

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, ingle Linear FM Pulse, Noiselike 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.

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.

TEXT BOOKS

1) M.I. Skolnik, Radar Handbook, McGraw Hill, 2nd ed., 1991.
2) Fred E. Nathanson, Radar Design Principles – Signal Processing and The Environment, 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. Nitzberg, 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

I Year II Sem M.Tech, (DECE)

NETWORK SECURITY AND CRYPTOGRAPHY
(ELECTIVE IV)

UNIT I

Introduction: Attacks, Services and Mechanisms, Security attacks, Security services, A Model for Internetwork security. CLASSICAL TECHNIQUES: Conventional Encryption model, Steganography, Classical encryption Techniques.

Number Theory: Prime and Relatively prime numbers, Modular arithmetic, Fermat's and Euler's theorems, Testing for primality, Euclid's Algorithm, Chinese remainder theorem, Discrete logarithms.

UNIT II

Modern Techniques: Simplified DES, Block Cipher Principles, Data Encryption standard, Strength of DES, Differential and Linear Cryptanalysis, Block Cipher Design Principles and Modes of operations.

Algorithms: Triple DES, International Data Encryption algorithm, Blowfish, RC5, CAST-128, RC2, Characteristics of Advanced Symmetric block cifers.

Conventional Encryption: Placement of Encryption function, Traffic confidentiality, Key distribution, Random Number Generation.

Public Key Cryptography: Principles, RSA Algorithm, Key Management, Diffie-Hellman Key exchange, Elliptic Curve Cryptograpy.

UNIT III

Zero Knowledge Protocols ,Intermediate Protocols

Message Authentication And Hash Functions: Authentication requirements and functions, Message Authentication, Hash functions, Security of Hash functions and MACs.

UNIT IV

Hash And Mac Algorithms: MD File, Message digest Algorithm, Secure Hash Algorithm, RIPEMD- 160, HMAC. **DIGITAL SIGNATURES AND AUTHENTICATION PROTOCOLS**: Digital signatures, Authentication Protocols, Digital signature standards.

Authentication Applications: Kerberos, X.509 directory Authentication service.

Electronic Mail Security: Pretty Good Privacy, S/MIME.

UNIT V

IP Security: Overview, Architecture, Authentication, Encapsulating Security Payload, Combining security Associations, Key Management.

Web Security:

Web Security requirements, Secure sockets layer and Transport layer security, Secure Electronic Transaction.

Intruders, Viruses And Worms: Intruders, Viruses and Related threats.

Fire Walls: Fire wall Design Principles, Trusted systems.

TEXT BOOKS

1. Cryptography and Network Security: Principles and Practice - William Stallings, Pearson Education., 2000.

2.Bruce Schneier: Applied Cryptography, Wiley Student Edition, 2nd Edition, Singapore, 1996.

REFERENCE BOOK

1. **Handbook of Applied Cryptography**. Alfred Menezes, Paul van Oorschot, and Scott Vanstone: CRC Press, NY.
2. **Principles of Network and Systems Administration, Mark Burgess, John Wiel**

I Year II Sem M.Tech, (DECE)

DESIGN FOR TESTABILITY
(ELECTIVE-IV)

UNIT I

Introduction to test and Design for Testability (DFT) Fundamentals
Modeling: Modeling Digital Circuits at Logic level , Register level, and Structural Models. Levels of Modeling. Logic Simulation Type of Simulation. Delay Models, Element Evaluation. Hazard Detection, Gate Level Event Driven Simulation

UNIT- II
Fault Modeling : Logic Fault Models. Fault Detection and Redundancy, Fault equivalence and Fault Location. Single Stock and Multiple Stock Fault Models. Fault Simulation Applications, General Techniques for Combinational Circuits.

UNIT- III
Testing for Single Faults (SSF)
Automated Test Pattern Generation (ATPG/ATG) for SSFs in Combinational and Sequential Circuits, Functional Testing with Specific Fault Models, Vector Simulation-ATPG vectors Formats, Compaction and Compression, Selecting ATPG Tool.

UNIT- IV
Design for Testability- Testability Trade-off's techniques, Scan Architectures and testing, Controllability and Absorbability, Generic Boundary Scan, Full Integrated Scan, Storage Cell foe Scan Design, Board level and system Level approaches, Boundary Scans Standards, compression techniques- Different Techniques, Syndrome test and Signature analysis

UNIT-V
Built –in Self Test (BIST)-Concepts and Test patten Generation. Specific BIST Architectures- LOCST, STUMPS, CBIST, RTD, BILBIO, Brief ideas on some advanced BIST concepts and design for Self test board level.

Memory BIST (MBIST) : Memory test Architectures and Techniques, Introduction to Memory test, Types of Memories and Integration, Embedded Memory testing Model, Memory test requirements for MBIST, JTAG Testing Features.

TEXT BOOKS:

1. Digital Systems Testing and Testable Design- Miron Abramovici, Melvin A. Breur, Arthu D.Friedman, John Wiley & Sons

2. Design for Test for Digital ICs & Embedded Core Systems- Alfred Crouch, 2008, PE

3. Introduction to VLSI Testing- Robrt.J.Feugate J, Steven M.Mclntyre, Englehood Cliffs, 1988, Prentice Hall.

REFERENCE BOOK:

1. Essentials of Electronics Testing- M.L.Bushnell, Vishwani.D.Agarwal, Springer.

I Year II Sem M.Tech, (DECE)

DIGITAL SIGNAL PROCESSING AND ARCHITECTURES (ELECTIVE IV)

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.

Computational Accuracy In DSP Implementations

Number formats for signals and coefficients in DSP systems, Dynamic Range and Precision, Sources of error in DSP implementations, A/D Conversion errors, DSP Computational errors, D/A Conversion Errors, Compensating filter.

UNIT II

Architectures For Programmable DSP Devices

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

UNIT III

Execution Control And Pipelining

Hardware looping, Interrupts, Stacks, Relative Branch support, Pipelining and Performance, Pipeline Depth, Interlocking, Branching effects, Interrupt effects, Pipeline Programming models.

Programmable Digital Signal Processors

Commercial Digital signal-processing Devices, Data Addressing modes of TMS320C54XX DSPs, Data Addressing modes of TMS320C54XX Processors, Memory space of TMS320C54XX Processors, Program Control, TMS320C54XX instructions and Programming, On-Chip Peripherals, Interrupts of TMS320C54XX processors, Pipeline Operation of TMS320C54XX Processors.

UNIT IV

Implementations Of Basic DSP Algorithms

The Q-notation, FIR Filters, IIR Filters, Interpolation Filters, Decimation Filters, PID Controller, Adaptive Filters, 2-D Signal Processing.

Implementation Of FFT Algorithms

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

UNIT V

Interfacing Memory And I/O Peripherals To Programmable DSP Devices

Memory space organization, External bus interfacing signals, Memory interface, Parallel I/O interface, Programmed I/O, Interrupts and I/O, Direct memory access (DMA). A Multichannel buffered serial port (McBSP), McBSP Programming, a CODEC interface circuit, CODEC programming, A CODEC-DSP interface example.

TEXT BOOKS

1. 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.

I-YEAR-II Sem M.Tech. (DECE)

ADVANCED COMMUNICATION LAB

Note:

A. Minimum of 10 Experiments have to be conducted

B. All Experiments may be simulated using MATLAB and verified using related training kits.

1. Effect of Sampling and Quantization of Digital Image
2. Verification of Various Transforms (FT/DCT/Walsh/Hadamard) on a given Image (Finding Transform and Inverse Transform).
3. Point, Line and Edge detection techniques using derivative operators.
4. Implementation of FIR filters using DSP Trainer Kit (C-Code/ Assembly code).
5. Implementation of IIR filters using DSP Trainer Kit (C-Code/ Assembly code).
6. Observing the waver forms at various test points of a mobile phone using Mobile phone Trainer.
7. Study of Direct Sequence Spectrum Modulation & Demodulation CDMA-DSS-BER Trainer. Measurement of Bit Error Rate using Binary Data.
8. Determination of Losses in Optical Fiber
9. Characteristics of LASER Diode.
10. Verification of minimum distance in Hamming code
11. Determination of output of Convolutional Encoder for a given sequence.
    Determination of output of Convolutional Decoder for a given sequence.