M.E. (ELECTRONICS) REVISED STRUCTURE

Four Semester Course

(w.e.f. June 2009)

Semester - I

Sr. No.	SUBJECT	TEACHING SCHEME			EXAMINATION SCHEME		
		L	T	P	Theory	TW	OE
1	VLSI Design	3	-	2	100	25	-
2	Advanced Digital Signal Processing	3	-	2	100	25	-
3	Advanced Network Engineering	3	1	-	100	25	-
4	Random Signals & Processes	3	-	2	100	25	-
5	Design and Analysis of Algorithms	3	1	-	100	25	-
6	Seminar	1	-	2	-	50	-
Total		**15**	**2**	**8**	**500**	**175**	**-**

Semester – II

Sr. No.	SUBJECT	TEACHING SCHEME			EXAMINATION SCHEME		
		L	T	P	Theory	TW	OE
1	Advanced Computer Architecture	3	1	-	100	25	-
2	Embedded System Design	3	-	2	100	25	-
3	Advanced Process Control	3	-	2	100	25	-
4	Elective – II	3	1	-	100	25	-
5	Elective – III	3	-	2	100	25	-
6	Seminar – II	-	-	2	-	50	-
Total		**15**	**2**	**8**	**500**	**175**	

Semester – III

Sr. No.	SUBJECT	TEACHING SCHEME					EXAMINATION SCHEME			
		L	PR	TU	DR	TOTAL	THEORY	TW	POE	OE
1	Seminar – III	-	1	-	-	1	-	50	-	-
2	Dissertation Phase- I	-	4	-	-	4	-	100	-	-
	Total	-	5	-	-	5	-	150	-	-

- TW marks in Seminar III shall be based on the delivery of at least two seminars in a Semester III. The topic of both the Seminars shall be related to his/her dissertation topic.
- T.W. marks for dissertation phase – I shall be based on the work carried out by the candidate based on his/her dissertation work in consultation with his/her guide.
- This work may also include related software assignment, field work, Industrial training etc. as decided by guide. The student shall submit the monthly progress report to the department. The student shall deliver a presentation at the end of Semester – III based on the work.

Semester - IV

SN	SUBJECT	TEACHING SCHEME					EXAMINATION SCHEME			
		L	PR	TU	DR	TOTAL	THEORY	TW	POE	OE
1	Dissertation Phase- II	-	5	-	-	5	-	100	-	200
	Total	-	5	-	-	5	-	100	-	200

- T.W. marks shall be based on the Seminar delivered by the Candidate based on his dissertation work.
- *Dissertation phase – II Oral examination shall based on the work carried out by the candidate in dissertation phase – I and phase – II

List of Elective Subjects for Semester I and II

M.E. (Electronics)

Sr. No.	Specialization	Elective - I	Elective - II	Elective –III
1	Telecommunication Engineering	1. Statistical Communication Theory	1.Communication Switching System 2.Mobile Communication Engineering	1. Broadband Communication
2	Computer Engineering	2. Design and Analysis of Algorithms	1. Neural Networks 2. Distributed Database System	1. Web Technology 2. Software Engineering

M.E.(ELECTRONICS) REVISED STRUCTURE
Four Semester Course.
Semester - I

		TEACHING SCHEME			EXAMINATION SCHEME		
SN	SUBJECT	L	T	P	PW	TW	OE
1	VLSI Design	3	-	2	100	25	-
2	Advanced Digital Signal Processing	3	-	2	100	25	-
3	Advanced Network Engineering	3	1	-	100	25	-
4	Random Signals & Processes	3	-	2	100	25	-
5	Design and Analysis of Algorithms	3	1	-	100	25	-
6	Seminar	1	-	2	-	50	-
	Total	15	2	8	500	175	-

Semester – II

		TEACHING SCHEME			EXAMINATION SCHEME		
SN	SUBJECT	L	T	P	PW	TW	OE
1	Advanced Computer Architecture	3	1	-	100	25	-
2	Embedded System Design	3	-	2	100	25	-
3	Advanced Process Control	3	-	2	100	25	-
4	Elective – II	3	1	-	100	25	-
5	Elective – III	3	-	2	100	25	-
6	Seminar – II	-	2	-	-	50	-
	Total	15	2	8	500	175	

Semester – III

		TEACHING SCHEME					EXAMINATION SCHEME			
SN	SUBJECT	L	PR	TU	DR	TOTAL	THEORY	TW	POE	OE
1	Seminar – III	-	1	-	-	1	-	50	-	-
2	Dissertation Phase- I	-	4	-	-	4	-	100	-	-
3	Total	-	5	-	-	5	-	150	-	-

- TW marks in Seminar III shall be based on the delivery of at least two seminars in a Semester III.The topic of both the Seminars shall be related to his/her dissertation topic.
- T.W. marks for dissertation phase – I shall be based on the work carried out by the candidate based on his/her dissertation work in consultation with his/her guide.
- This work may also include related software assignment, field work, Industrial training etc. as decided by guide. The student shall submit the monthly progress report to the department. The student shall deliver a presentation at the end of Semester – III based on the work.

Semester - IV

		TEACHING SCHEME					EXAMINATION SCHEME			
SN	SUBJECT	L	PR	TU	DR	TOTAL	THEORY	TW	POE	OE
1	Dissertation Phase- II	-	5	-	-	5	-	100	-	200
	Total	-	5	-	-	5	-	100	-	200

- T.W. marks shall be based on the Seminar delivered by the Candidate based on his dissertation work.
- *Dissertation phase – II Oral examination shall based on the work carried out by the candidate in dissertation phase – I and phase – II

List of Elective Subjects for Semester I and II
M.E.(Electronics)

SN	Specialization	Elective - I	Elective - II	Elective - II
1	Telecommunication Engineering	Statistical Communication Theory	1.Communication Switching System 2.Mobile Communication Engineering	Broadband Communication
2	Computer Engineering	Design and Analysis of Algorithms	1. Web Technology 2. Software Engineering	

M.E. (Electronics) Semester. – I

1. VLSI DESIGN

Lect : - 3 Hrs. /week Theory:- 100 marks
Pract : - 2 Hrs. /week T. W. : - 25 marks

1. **Introduction to CMOS systems**: MOS transistors and switches, CMOS logic, Circuit and system representation. (3)

2. **MOS Transistor Theory**: Introduction, MOS device design equations, MOS models, CMOS invertors, pseudo NMOS invertors, NMOS pass transistor, CMOS Transmission gate, Logic using transmission gate. (5)

3. **CMOS processing technology**: Overview of silicon semiconductor technology, Basic CMOS technology, (n-well CMOS, p-well, CMOS, twin tub process), interconnect, circuit elements, logic design rules, latch-up (5)

4. **CMOS Characterization and performance estimation**: Resistance, capacitance and inductance estimation, switching characteristics, analytical delay models, empirical delay models, gate delays, Transistor sizing, power dissipation, sizing of routing conductors, charge sharing, design margins, scaling of MOS transistor dimensions, reliability issues. (7)

5. **CMOS circuit and logic design**: CMOS logic gate design, Basic physical design of simple logic gates, CMOS logic structures, Clocking strategies, I/O structures, ESD protection, low power design. (7)

6. **CMOS system design methods: Design strategies**: CMOS chip design equations, Programmable logic programmable logic, FPHAs, Sea of gates and gate array designs, standard cell design, full custom mask design, symbolic layout, Design methods, Design capture tools, Design verification tools, economics (7)

7. **CMOS testing**: The need for testing, fault models, fault coverage, ATPG, fault grading and fault simulation, statistical fault analysis, fault sampling Design for testability, Scan based test technique, Self test techniques, chip level test techniques, system level test techniques, boundary scan test, BIST, layout design for improved testability. (4)

8. **CMOS subsystem Design**: Transmission gate adder, parity generators, zero/one detector, synchronous counters, array multiplexer, shifter, memory element, SRAM, DRAM, Row/column decoder, ROM, non-volatile memory, flash memory, Control logic implementation, CPU, gate matrix standard cell.

Reference Books:-

1. Principles of CMOS, VLSI Design: Westes, Esharghion, **Addison Wesley**.
2. CMOS digital integrated circuits, Analysis and Design: Kenj, Lebletici, **TATA McGRAW Hill**.

Note- Practical Should be based on Software Tool or any other physical layer design tool. - Minimum 10 numbers

2. ADVANCED DIGITAL SIGNAL PROCESSING

Lect. :- 3 Hrs./week	Theory :- 100 marks
Pract. :- 2 Hrs./week	T.W. :- 25 marks

1. **DFT, Properties of DFT:** Linear filtering methods based on DFT. Use of DFT in linear filtering, filtering of long data sequences, frequency analysis of signals using DFT. FFT, Linear filtering approach to computation of DFT, the Gortzel algorithm, the chirp-Z algorithm. (6)

2. **Linear prediction & optimal linear filters**: Forward and backward linear prediction. The optimum reflection coefficient for the forward and backward predictors. Relationship of an AR process to linear prediction. The Levinson Durbin algorithm. The Schur algorithm. (6)

3. **Power spectrum estimation**: Estimation of spectra from finite duration observation of signals. Computation of energy density function, Estimation of auto-correlation and power spectrum of random signals, the period gram. The use of the use of DFT in power spectrum estimation. Parametric methods for power spectrum estimation. i) AR model parameters for power spectrum estimation. (7)

4. **Design of digital filters**: FIR filters, Fourier Series Expansion method, Windowing, Design of linear phase FIR filters by frequency sampling method. Design of optimum equiripple linear phase FIR filters. Design of FIR differentiator. Design of Hilbert transformers. (5)

5. **IIR filters**, Design of IIR filter using BLT method, Design of digital filters based on least squares methods: Pade approximation method. Least squares design methods. (5)

6. **Multirate DSP**: Decimation by a factor of D. Interpolation by a factor of I. Sampling rate conversion by a rational factor I/D. Filter design & implementation for sampling rate conversion, direct from FIR filter structure. (6)

Reference Books-

1. Digital signal processing:- Principles, algorithms and applications: John. G Proakis, **PHI Publication.**
2. Advanced DSP: Proakis, Rade, Ling. **Mc millan publication**.
3. Discrete time signal processing: A.V. Oppenheim and R.W. Schafer.
4. Theory and application of digital signal processing: **I.R. Rabiner and Gold**.
5. Introduction to digital signal processing: **Johnny R Johnson.**
6. Introduction to DSP: Roman Kuc. **McGRAW Hill Publication**.

3. ADVANCED NETWORK ENGINEERING

Lect. :- 3 Hrs./week Theory : 100 marks.
Tutorial: - 1 Hr./week T. W. : 25 marks.

1. **Introduction to Internet technology**: Internet addresses, ARP, RARP, Tools of Internet access and addressing, ICMP, UDP, TCP, Kern's algorithm, congestion, TCP finite state diagram. Routing, mobile (6)

2. **DNS techniques, DNS: Names for machines:** Flat Namespace, Hierarchical Names, Delegation of Authority for Names, Subset Authority, TCP/IP Internet domain names, official and unofficial Internet, Domain names, items named and Syntax of names, mapping domain, names to addresses, domain name resolution, efficient translation caching: The key to efficiency, Domain mapping message format, compressed name format, abbreviation of domain names, inverse mappings, pointer queries, object types and resource record contents, obtaining authority for a sub domain. (5)

3. **Remote Login: Remote Interactive computing:** TELNET PROTOCOL, ACCOMODATING heterogeneity, passing. Commands that controls the remote side, forcing the server to read a control function TELNET option. Negotiation, rlogin (BSD unix). (3)

4. **FTP:** File access and transfer, Online shared access, sharing by file transfer, FTP: The major view of FTP, An example of anonymous FTP session, TFTP, NFS, NFS Implementation, Remote procedure call (RPC). (2)

5. **Electronic Mail: Electronic Mail**: Mailbox Names and Aliases, Alias Expansion and Mail, Forwarding the relationship of Internetworking and mail, TCP/IP standards for electronic mail service, electronic mail addresses, Pseudo domain addresses, simple mail transfer protocol (SMTP), The MIME extension for Non- ASCII Data, MIME multipart messages.

6. Voice and video over IP: real time transport protocol, rtp encapsulation, QoS (2)

7. **Internet management**: The level of management protocols, architectural model, protocol architecture, Examples of MIB Variables, The structure of Management information, format definitions DSN. 1, Structure and Representation of MIB object names, simple network management protocol, SNMP message format, Example Encoded SNMP message.

8. **Internet Security and Firewall Design**: Protection resources, the need for an information policy, communication, cooperation, and mutual mistrust, mechanisms for internet security, firewalls and Internet access, multiple connections and weakest links, firewall implementation and High-speed Hardware, packet-level filters, security and packet filter specifications, the consequence of restricted access for clients, Accessing services through A firewall, the details of firewall architecture, Types of fire walls, stub network, An alternative Firewall implementation, monitoring and logging. (6)

9. **Futures of TCP/IP**: Why change TCP/IP and the Internet? Motivation for changing Ipv4m, The road to a new version of IP, T he names of the next IP, Features of Ipv6, General form of an Ipv6 address types, the duality of broadcast and multicast, An engineering choice and simulated broadcast, proposed Ipv6 Address space assignment, Ipv4 Address encoding and transition, providers, subscribers and address Hierarchy, additional Hierarchy. (4)

10. **Bluetooth Technology**: overview, protocol stack, link manager, Host controller interface, service discovery protocol, WAP, Applications, encryption and security, QoS.

Reference Books-

1. Internetworking with TCP/IP - D.E.Comer Vol. I (4th edition),Vol-II & Vol- III, **(PHI)**
2. UNIX Network Programming: III Edition – Richard Steven **(PHI)**
3. Bluetooth connect without cables:- Jennifer Bray & Charles Sturman **(Person education Asia LPE)**
4. Data communications and networking:- Behrmz Foruzan – **(TMH)**

4. RANDOM SIGNALS AND PROCESSES

Lect. :- 3 Hrs./week Theory:- 100 marks.
Pract. :- 2 Hrs./week T.W. :- 25 marks.

1. **Introduction to Probability**:- Sample spaces, Conditional probability and Bayes' theorem, Independence of events Bernoulli trails. (4)

2. **Random variables**:- Cumulative distribution function, Joint probability density function, statistical properties, Jointly distributed Gaussion random variables, Conditional probability density, properties of sum of random variables, central limit theorem, Estimate of population means, expected value and variance and covariance, Computer generation of random variables. (8)

3. **Multiple random variables**:- Joint cumulative distribution function, Joint probability density function statistical properties, Jointly distributed Gaussion random variables, Conditional probability density, properties of sum of random variables, Central limit theorem, Estimate of population mean, expected value and variance and covariance, Computer generation of random variables. (8)

4. **Random processes**:- Properties, Auto correlation and cross correlation function, Estimate of auto correlation function. (6)

5. **Spectral Density**:- Definition, Properties, white noise, Estimation of auto-correlation function using frequency domain technique, Estimate of spectral density, cross spectral density and its estimation, coherence. (5)

6. **Linear System**:- Properties, Response using frequency domain techniques, Matched filters continuous and discrete Fourier Transform, Introduction to FET. (4).

7. **Queuing Theory**:- Introduction Cost equation, steady state probabilities, Models of single server exponential queuing system with no limit and with finite buffer capacity (M/M/I, M/M/N). Queuing system with bulk service, Network of queues with open system and closed system. The M/G/I system and application of work to M/G/I. (8)

Reference Books:-

1. Introduction to Probability and Random Processes.: George I. Aunin, V. Chandrasekar.
2. Introduction to Probability Models, (Third edition): By Sheldon M. Ross.
3. Digital signal processing – Principles Algorithms and Applications: By John G. Proakis

5. DESIGN AND ANALYSIS OF ALGORITHMS

Lect. :- 3 Hrs./week Theory :- 100 marks
Tutorial :- 1 Hr./week T.W. :- 25 marks

1. **Introduction:** Static and dynamic structures, stacks, queues, dynamic memory allocation and pointers, linked stacks and queues, linked list in arrays, trees and recursion, Hashing:- Sparse-table, hash function, collision resolution with open addressing and collision resolution by chaining, hashing analysis. (6)

2. **Searching and sorting Algorithms**: Sequential search, Binary search, Comparison of trees, Insertion sort, Selection sort (Heap sort), Shell sort. Computational Complexity, lower bound, & comparison of searching and sorting algorithm. (5)

3. **Divide and conquer**: Merge sort, quick sort (portioning), strassen's matrix multiplication algorithm, Detection Thresholds, Limitation of divide and conquer. Computational complexity of divide and conquer algorithms and their comparisons. (5)

4. **Dynamic Programming**: Binomial Coefficients, Floyd's algorithm for shortest path, Chain matrix multiplication, optimal binary search trees and the traveling salesperson problem, Dynamic programming approach to 0-1 knapsack problem. (5)

5. **Greedy Approach**: Minimum spanning traces algorithms (Prim's and Kruskal's) and their comparison. Dijkstra's algorithm for shortest path. Scheduling. Greedy approach for knapsack 0-1 problem. Comparison between Greedy approach for knapsack 0-1 problem. (5)

6. **Back tracking:** Back tracking techniques, the n-queens problem, Back tracking algorithm's efficiency using Monte Carlo algorithm. Graph coloring, the Hamiltomnian circuits problem. Backtracking Algorithm for 0-1 Knapsack problem and its comparison with dynamic programming approach. (5)
7. **Branch and Bound**:0-1 Knapsack problem:- Breadth – First search with Branch-and-bound pruning and Best first search with Branch – and – Bound pruning, the Traveling sales person problem. (4)

8. **Theory of NP:** Intractability, the three general categories of problems. The sets P & NP. NP complete problems, NP-Hard, NP-easy, NP – Equivalent problems, NP- Hard problems – Traveling sales person problem and Bin packing problem. (4)

1. **Fundamentals of Computer Algorithms** -Ellis Horowitz, Sartaj Sahani, Sangutherar Rajasekaran

2. **Foundation of algorithms**: - Richard E. Neapolita & Kumarss Naimipour,(Northeastern Illinois University) - D.C. Heath and Company, Publication.
3. **Data structures and program design in C**: - Robert L. Kruse & Brunce P. Leung et. Al.- PHI Publication.
4. **Data structures and Algorithms** – 1: sorting and searching - Kurt Mehlhorn- Springer – Verlag publication
5. **Sorting and searching: The art of computer programming**: - Knuth D.E..- Vol.3. Addison-Wesley, Reading HA (1977)
6. **Design and analysis of Parallel algorithms**.: - Selim G. Aki- PH Publication.
7. **Analysis of Computer Algorithms**: - Horowitz and Sahni- Galgotia Publishers

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M.E. (Electronics) Semester – II

1. ADVANCED COMPUTER ARCHITECTURE

Lect. :- 3 Hrs./week Theory: 100 marks
Tutorial :- 1 Hr./week T.W. : 25 marks.

1. **Instruction set principles**: Classifying instruction set architectures, Memory addressing, Operations in the instruction, set, Types and size of operands, Encoding an instruction set, DLX architecture (7)

2. **Pipelining**:- Basic principles of DLX, Major hurdle of pipelining, Data hazards, control hazards, pipeline implementation problems. Extending DLX pipeline to handle multi-cycle operations. (7)

3. **Advanced pipelining & instruction level parallelism**:- Concepts and challenges. Overcoming data hazards with Dynamic scheduling, Reducing branch penalties with dynamic hardware prediction, Compiler support for exploiting ILP, Hardware support for extracting more parallelism, studies of ILP. (10)

4. **Multiprocessors**:- Characteristics of Application domains, Centralized shared memory architectures, Distributed shared memory architectures, Synchronization, Models of memory consistency. (8)

5. **Vector processors**:- Need for vector processors, Basic vector architecture, vector length and stride, Effectiveness of compiler vectorization, Enhancing vector performance. (7)

Reference Books-

1. "**Computer Architecture – A Quantitative approach**" – J.L. Hennessy & D.A. Patterson.
(**A Harcourt Publishers International company.)**

2. **Computer Architecture and Parallel processing** – Kai Hwang and Faye Briggs.

2. EMBEDDED SYSTEM DESIGN THEORY

Lect. :- 3 Hrs./week Theory:- 100 marks
Pract. :- 2 Hrs./week T.W. :- 25 marks

1. **CPU architecture and Programming**: Embedded system information revolution, PIC micro-controllers 16F84/8xx, PIC development tools, Harvard architecture, pipelining, Register file structure, addressing modes, Instruction set and simple programs, MPASM directives, special features of PIC controllers, List fil and hex file generation, table accessing from program memory, Macros, Programming using C language. (5)

2. **I/O ports, Timer and Interrupts**: I/O port access, Keyboard and LCD display interfacing, Timer2, interrupt logic, interrupt constraints, shared Data problem, Interrupt latency, Improved Interrupt servicing, Code structure for large programs. (5)

3. **External Interrupts and timer**: Handling external interrupts, Timer0, Compare/Capture mode, Timer1, Sleep mode, PWM mode, Change on Pin interrupts. (5)

4. **I2C Bus, ADC and UART:** 12C, Bus operation, 12C Bus subroutines, programs for temperature indicator using MAX518, Accessing serial EEPRO, ADC structure, ADC routines, UART, Baud rate selection, UART initialization, Synchronous serial port module, Serial peripheral interface, Output port expansion, Input port expansion, programs for hardware control using Hyper-terminal. (5)

5. **Introduction to RTOS**: Round robin with interrupt, Function-queue scheduling architecture, RTOs, tasks, task states, semaphores and shared data. (5)

6. **RTOS Services** :Message queues, mailboxes, pipes, queues, timer function, events memory management, Interrupt routines in RTOS. (5)

7. **Design Using RTOS:** Principle, sample Example, Encapsulating semaphores and queues, Hard real-time scheduling consideration, power saving and memory. (5)

8. **Embedded software development tools**: Host and Target machines, Linker/Locator for embedded software, loading embedded software in target system, debugging techniques. (5)

Reference Books:

1. **Design with PIC micro-controllers**: John B. Peatman, Person Education Asia Publication.
2. **An Embedded software Primer:** David E. Simon, Pearson Education Asia Publication.
3. **Application Notes** from http://www.microchip.com
4. **Microchip Product catalog CD** (available freely from Microchip)

3. ADVANCED PROCESS CONTROL

Lect. :- 3 Hrs./week Theory :-100 marks
Pract :- 2 Hrs./week T.W. :- 25 marks

1. **Process Dynamics and mathematical modeling**: Modeling procedure, Linearization, numerical solutions of ordinary differential equations, input-output models and transfer functions, Dynamic behavior of typical process systems, Serial & parallel structures of simple systems, Multiple Input-Multiple Output systems. (5)
2. **Empirical Model Identification:** An Empirical model building procedure, process reaction curve methods, statistical model identification. (5)
3. **Conventional Feedback control system**: Desired features of a PID controller, PID controller tuning for dynamic performance, Stability analysis of control systems, Controller tuning based on stability: Ziegler – Nichols closed loop method, Digital implementation of process control, Effects of digital control on stability, Tuning and performance, Performance of feedback control systems. (5)
4. **Cascade & Feed forward control**: Cascade control: Design criterion, Cascade performance, Controller algorithm & tuning, Implementation issues. Feed forward Control: Design criterion, Feed forward performance, controller algorithm and tuning, implementation issues. Analyzing a nonlinear process with linear feedback control, Different issues in improving nonlinear process performance (5)
5. **Model Based Control**: The structure of model based control, Modeling approaches, Internal model control (IMC), The smith predictor, Model predictive control (MPC), Process model based control (PMBC), Implementation guidelines. (4)
6. **Nonlinear Adaptive Control:** Adaptation of feedback parameters, Programmed adaptation, switching controller gains and self-tuning controllers: Model based methods, model reference adaptive control, pattern recognition controllers. (4)
7. **Multivariable control**: Multi-loop control, effects of interaction, performance analysis, Multivariable predictive control, Dynamic matrix control (DMC) approach for signal variable and multivariable, implementation issues in DMC. (6)
8. **Statistical Process Control:** Shewhart chart, Interpretation of chart, Distinction between automatic process control (APC) & statistical process control (SPC), Implementing SPC concepts. (3)
9. **Programmable Logic Controller (PLC)**: Binary logic diagrams for process operations, Ladder diagrams, Optimization of logic circuits, PLC architecture, Programming fundamentals, PLC software advances.

Reference Books-

1. Process Control: Designing processes & control systems for dynamic performance by Thomas E. Marlin, McGRAW Hill International Edition.
2. Process Control: Instrument Engineers handbook
   Editor - Bela G. Liptak, Butterworth - Heinemann Publishers.
3. Process Dynamics: Modeling, Analysis & Simulation by B. Wayne Bequette, Prentice Hall International Edition.
4. Process Modeling, Simulation and control for chemical engineers, by William Luben, McGRAW Hill International Edition.
5. Process control systems: Application, Design and Turning by F.G. Sinskey, McGRAW Hill Publication
6. Applied Process Control by M. Chidambaram, Allied Publishers LTD.

3. **STATISTICAL COMMUNICATION THEORY.**

Elective-I (Telecom. Engg)

Lect. :- 3 Hrs./week	Theory :- 100 marks
Pract. :- 1 Hr./week	T.W. :- 25 marks

1. **Random Signal Theory**: Review of Prob. Theory, Random process, Stationary process, Auto correlation function, Cross correlation function, Power spectral density, Power spectrum and auto correlation function, Cross spectral densities, cross power spectrum, cross correlation function, PN sequence and auto correlation. (6)

2**. Information Measure**: Discrete entropy, Joint and conditional entropy, entropy in continuous case, purpose of encoding, Noiseless coding, Unique decipherability, Kraft inequity, McMillans Theorem, Noiseless coding theorem, Shannon binary coding, Construction of optimal codes, application Huffman coding. (5)

3. **Noise Coding**: Discrete Memory less channel, mutual information, classification of channels, calculations of channel capacity, decoding schemes, The Fano's inequality, The Shanon's theorem, capacity of Bandlimited Gaussian Channel (5)

4. **Transmission Through Network**: Convolution Theory, Classification of Systems, random signal response of Linear system, Frequency domain analysis, Bandpass network, equivalent noise bandwidth, envelope of sinewave with Gaussian noise, Parseval's theorem. (5)

5. **Optimal Linear System**: The matched filter, Spectral factorization, matched filter by pre whitening technique, linear estimation with LMSE criterion-wieners filters, Bode and Shannon methods for LMSE filtering and prediction problem, Gaussian noise correlator receiver, correlation receiver using vector channel. (5)

6. **Testing of Statistical Hypothesis**: Likelihood ratio tests, Bay's test, Minimax text, Neyman's Pearson test, Receiver operating characteristics, Optimum reception of binary signal in Gaussian Noise. (6)

7. **Estimation of Parameters**: Estimation of random parameters, Invariance of estimator, maximum likelihood estimator, MSC estimator, Pulse radar system, The radar equation, parameter estimation applied to radar, detection of steady point target, estimator of range and velocity. (7)

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Reference Books:-

1. **Statistical Theory of Communication** – By S.P. Eugene Xavier
2. **Probability Information and Coding Theory** - By Dr. P.S. Sathyanarayan.
3. **Digital Communication: Fundamentals and applications**.- By Bernard Sklar.
4. **An Introduction to the principles of communication theory**: By J.C. Hancock TMH Publishing company Ltd.
5. **Statistical Signal processing with applications:** By Srinath, Rajasekaran, Vishwanathan, PHI Publication.

COMMUNICATION SWITCHING SYSTEMS

Elective-II (Telecom. Engg)

Lect. :- 3 Hrs./week	Theory :- 100 marks
Tutorial:- 1Hr./week	T.W. :- 25 marks

1. **Introduction:** Evolution of telecommunications, Classification of switching systems, Switching network configurations, Elements of switching system. (2)

2. **Space and Time Division switching**: Space and time switches, Time division switching, Basic networks, Bi-directional paths, complex switching networks, concentrators, PBX switches, Digital cross-connected units, Grade of service of TD switching networks, Non-blocking networks, Synchronization. (8)

3. **Switching Networks:** Single stage networks, Gradings- Principle, Design of progressive grading, Link system – two stage, three stage, four stage networks, Grades of service of link systems, strict sense non-blocking networks. (5)

4. **Control of Switching Systems**: Call processing functions, Sequence of operation, signal exchanges, state transition diagrams, Common control, Reliability, Availability, security. (5)

5. **Stored Program Control**: Processor architecture, Distributed processing, Software architecture, overload control, Enhanced services. (4)

6. **Switching Techniques for Data Transmission**: Difference between voice and data traffic, Circuit switching, Packet switching, store and forward networks. (4)

7. **Signaling Techniques**: In-channel signaling, Common channel signaling. (4)

8. **Traffic Engineering:** Unit of traffic, congestion, Traffic measurements, Mathematical model, Lost call systems-theory, Traffic performance, Queuing systems, Second erlang distribution, Probability of delay, finite queue capacity, System with single server, Queues in Tandem, Simulation.

Reference Books:-

1. **Telecommunication Switching, Traffic and Networks**: – J.C. Flood -- **PHI**
2. **Telecommunication switching system and networks**: Thaiyagrajan Vishwanathan - **PHI**
3. **Telecommunication Switching Principles**: George Allen and Unwin – **M.T. Hills.**
4. **An Engineering Approach to Computer Networking**: ATM Networks, the internet and telephone network - S. Keshav- **Addison Wesley**

COMMUNICATION SWITCHING SYSTEMS

Elective-II (Telecom. Engg)

Lect. :- 3 Hrs./week	Theory :- 100 marks
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3. **Switching Networks:** Single stage networks, Gradings- Principle, Design of progressive grading, Link system – two stage, three stage, four stage networks, Grades of service of link systems, strict sense non-blocking networks. (5)

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6. **Switching Techniques for Data Transmission**: Difference between voice and data traffic, Circuit switching, Packet switching, store and forward networks. (4)

7. **Signaling Techniques**: In-channel signaling, Common channel signaling. (4)

8. **Traffic Engineering:** Unit of traffic, congestion, Traffic measurements, Mathematical model, Lost call systems-theory, Traffic performance, Queuing systems, Second erlang distribution, Probability of delay, finite queue capacity, System with single server, Queues in Tandem, Simulation.

Reference Books:-

1. **Telecommunication Switching, Traffic and Networks**: – J.C. Flood -- **PHI**
2. **Telecommunication switching system and networks**: Thaiyagrajan Vishwanathan - **PHI**
3. **Telecommunication Switching Principles**: George Allen and Unwin – **M.T. Hills.**
4. **An Engineering Approach to Computer Networking**: ATM Networks, the internet and telephone network - S. Keshav- **Addison Wesley**

MOBILE COMMUNICATION ENGINEERING

Elective-II (Telecom. Engg.)

Lect. :- 3 Hrs./week Theory:- 100 marks
Tutorial:- 1Hr./week T.W. :- 25 marks.

1. **Mobil radio propagation**: Free space propagation model. Basic propagation mechanisms, reflection, diffraction, scattering practical link budget decision using path loss models. (8)

2. **Small scale fading and multipath**: Small scale multipath propagation, Impulse response model of a multipath channel, Small scale multipath measurements, parameters of mobile multipath channels, Types of small scale fading, fading effects due to multipath time delay spread, Fading effects due to Doppler spread. (8)

3. **Modern Technology**: Basic modulation techniques, Theoretical limits and practical impairments, Radio communication on flat Rayleigh fading channels, standard radio modems for wireless networks. (5)

4. **Signal Processing for Wireless communication**: Source coding for wireless applications Basic signal processing, Performance in Frequency selective multipath fading, multipath fading and time (in-band) diversity, Adaptive receivers, for time (in-band) diversity, Adaptive channel measurement, Adaptive equalization. (8)

5. **Digital Cellular Systems**: Details of GSM, North American TDMA, CDMA. (5)

6. **Miscellaneous Mobile Systems**: Analog and digital cordless, DECT, PACS, PCS – Technologies and standard wireless loops (6)

Reference Books:-

1. **Mobile Cellular Telecommunications**, 2nd Ed – W.W. Lee **-MGH**
2. **PCS and Digital Cellular technologies**:– Rifaat A. Dayem - **PHI**
3. **Wireless Communication, Principles and Practice**:– Theodore D. Rappaport- **PH PTR**
4. **Wireless Communication-Modulation and spread spectrum**: Kamilo Feher - **PHI**
5. **Mobile and PCS services** – Raj Pandya.- **PHI**

BROADBAND COMMUNICATION

Elective-II (Telecom. Engg.)

1. I**ntroduction**: Technologies, for transmission, switching, signaling, packet communication, Comparison of packet switching and circuit switching (2)

2. **Traffic characterization for Broadband services**: Introduction, Packet voice modeling, Fluid source modeling of packet voice, Markov- modulated Poisson process, Video traffic characterization, Fluid source modeling of video traffic, Bursty traffic model. (6)

3. **ISDN Basics, Interfaces and Functions**: Integration of transmission and switching, analog and digital switching, principles of ISDN, ISDN standards, ISDN transmission structure, User- Network interface, ISDN protocol architecture, ISDN connections, addressing and interworking. (6)

4. **Frame Relay**: X.25 Vs. frame relaying, frame-mode protocol architecture, Frame relay and frame switching, Frame-mode call control, call control protocol, DLCI bearer capability, Link layer core parameter, LAPF, Congestion control in frame relay. (6)

5. **B-ISDN**: Standard, Broadband services, Architecture, Protocol reference model, Physical layer, SONET/SDH (4)

6. **ATM:** Overview, virtual channels, virtual paths, VP & VC switching ATM cell, Header format, Generic flow control, Header error control, Transmission of ATM cells, Adaptation layer, AAL services and protocols. (5)

7. **ATM Switching:** ATM switching building blocks, Cell processing in a switch, Matrix type switch, Input buffering, Output buffering, Central buffering, Knockout switch, Performance aspects of buffering, Switching networks. (6)

8. **Feedback Congestion control in Broadband Networks**: End-to-end traffic bounds, deterministic and stochastic bounds, Congestion and congestion control mechanisms, Rate based traffic control.

Reference Books-

1. ISDN and Broadband ISDN with frame relay and ATM: William Stallings. -PHI
2. Broadband Integrated Networks: Mischa Schwartz - PH
3. Broadband communication Balajikumar –MGH

NEURAL NETWORKS

Elective – II (Computer Engineering)

Lect. :- 3 Hrs./week Theory:- 100 marks
Tutorial:-1 Hr./week T.W. :- 25 marks.

1. **Introduction**: Neuron structure, Neural Net architecture, Neural learning, Neural Evolution. (3)

2. **Supervised Learning (Single layer Network)** : Perceptions, Linear seperability, Perception training algorithm (4)

3. **Supervised Learning (Multilayer Network-I)**: Multilayer discrimination, Back propagation Algorithm, Setting parameters values, Accelerating learning process, Application. (4)

4. **Supervised learning (Multilayer Network – II)** :Adaptive Multilayer networks, prediction network, Radial basis functions, polynomial networks, regularization. (4)

5. **Unsupervised Learning**: Winner take all networks, Adaptive resonance theory, Topologically organized networks, Distance based learning, Neocognitron, Principal component analysis networks. (6)

6. **Associative Models**: Non-iterative procedure for association, Hopefield networks, Brain – state – in – a – box network, Boltzmaan machines, Hetero Association. (6)

7. **Optimization Methods**: Optimization using Hopefield Network, Iterative Gradiant descent, Simulated annealing, Random search, Evolutionary computations. (6)

8. **Applications**: Character Recognition, Control application, Robot Kinematics, Medical diagnosis, Semantic maps. (6)

Reference Books:-

1. Elements of Artificial Neural Network: - Mehrotra, Mohan, Ranka, PENRAM Publication.
2. Introduction to Artificial Neural Networks: - Zurada, JAICO Publication.

DISTRIBUTED DATABASE SYSTEM

Elective – II (Computer Engineering)

Lect. :- 3 Hrs./week Theory :- 100 marks.
Tutorial:- 1 Hr./week T.W. :- 25 marks.

1. **Levels of Distributed databases**: Reference Architecture for distributed databases, types of data fragmentation, distribution transparency for read only and update applications, distributed database access primitives, integrity constraints in distributed databases. (4)

2. **Distributed Database design**: A framework for distributed database design, design of database fragmentation, the allocation of fragments. (3)

3. **Translation of global queries to fragment queries**: Equivalence transformations, for queries, transforming global queries into fragment queries, distributed grouping and aggregate function evaluation parametric queries. (4)

4. **Optimization of Access Strategies**: A framework for query optimization, joint queries, general queries. (3)

5. **The management of distributed transactions**: A framework for transaction management, supporting atomicity of distributed transactions, concurrency control for distributed transactions, architectural aspects of distributed transactions. (4)

6. **Concurrency control:** Foundations of distributed concurrency control, distributed deadlocks, concurrency control based on time-stamps, optimistic methods for distributed concurrency control. (6)

7. **Reliability**: Basic concepts, non-blocking commitment protocols, reliability and concurrency control, determining a consistent view of the network, detection and resolution of inconsistency, check – points and cold restarts. (6)

8. **Distributed Database administration**: Catalog management in distributed Databases, authorization and protection. (3)

9. **Distributed object database management systems**: Fundamental object concepts, object distribution design, architectural issues, object management (3)

10. **Case studies**: A distributed database manager based on Adaptex, Multibase. (3)

Reference Books:

1. Distributed Databases – Principles and Systems – Stefano Ceri, Gueseppe Pelagatti (MGH International)

2. Principals of distributed database systems – 2nd edition – M.Tamer Ozsu and Patric Valduriez (Pearson Education Asia-LPE)

3. An introduction to Database systems – Desai Bipin (Galgotia)

4. Database system concepts – Korth, Sylberschartz and Sudarshan (3rd Edition MGH)

WEB TECHNOLOGY

Elective – III (Computer Engineering)

Lect. :- 3 Hrs./week Theory :- 100 marks
Pract. :- 2 Hrs./week T. W. :- 25 marks

1. **An XM. Prime**: History of XML, Benefits of XML., Components of XML, Parsing XML, Parsing methodologies, SAZ API, Stylesheet (XLS), overview Referring XLS Stylesheet. (3)

2. **The Document object model (DOM):** Defining the document object model, DOM core level I, creating document objects, node interface Node list and name node map, Document interface, Element interface, Attr interface, Additional Interfaces, Creating DOM elements, DOM level II, The DOM Core defined, Implementation anomalies. (3)

3. **Java Servlets:** Servlet architecture, Servlet interface, Servlet HTTP interface, Request processing, Response generation, Session management, Servlet development, Servlet configuration, Servlet service management. (8)

4. **Java server pages**: JSP overviews, JSP language basics, JSP translation and compilation directives, Java scripting from JSP, Java abstraction of JSP, Standard Java objects from JSP, Standard Java action from JSP, JSP Configuration and deployment, Custom Java actions and Tags from JSP. (6)

5. **Introduction to distributed objects**: 2-tier, 3-tier, N-tier architectures. Managing distributed systems, State of distributed objects. (3)

6. **The dominance of COM, DCOM, CORBA**: COM Architecture, COBRA architecture, DCOM architecture, Distributed object fundamentals. (3)

7. **COM Server**: Creating of server, Types, Assessing the server side aggregatable & non aggregatable COM, Essential services, COM Client, Desktop clients, Internet clients in VC, VB, JAVA clients. (5)

8 **CORBA server**: Creation of server, types, assessing the server side essential services, CORBA Client, Desktop clients, Internet clients in VC, VB, JAVA clients. (5)

9. **Bridging COM & CORBA**: custom bridging approaches. (2)

10. **Web server deployment**: Study of web server, different types of servers, Enterprise application server. (3)

Reference Books:-

1. Java Server pages – Lame Pekowsky (Addison Wesley)
2. Jav Servlets – Karl Moss (TMGH)
3. XML Development with java 2 by Daconta & Saganich., **Sams Techmedia Publication**.
4. The XML Handbook by Goldfourb Prescod, **AWL LPE**.
5. COM & CORBA side by side architecture strategies & Implementation, **Janson Pritchard Addison Wesley Publication**
6. Learn Activex Template library development with VC++ 6.0 , By Nathan Wallace, **BPB**

SOFTWARE ENGINEERING

Elective – III (Computer Engineering)

Lect. :- 3 Hrs./week Theory :- 100 marks
Pract. :- 2 Hrs./week T.W. :- 25 marks.

1. **Software and software Engineering**: The importance of software: A crisis on the Horizon, Software Myths, Software paradigms, A generic view of software Engineering. (3)

2. **Project Management**: (A) software metrics: The project management process, Metrics for software productivity and quality, Measuring software. (B) Estimation: Observation on Estimating, Project planning Objectives, software scope, Resources, software project estimation, Decomposition Techniques. C) Planning: Risk analysis, software project scheduling, Software acquisition, Software Re-engineering, Organizational planning. The software project plan. (5)

3. **Computer System Engineering**: Computer Based systems, Computer System Engineering systems analysis, Modeling the systems architecture, System modeling and simulation, System specification. (4)

4. **Requirement analysis fundamentals**: Requirement analysis, Problem areas, Communication techniques, Analysis principles, software prototyping, specifications. (3)

5. **Object oriented analysis and Data modeling**: Object oriented concepts, Analysis and modeling, Data modeling (3)

6. **Software Design fundamentals**: Software Design and Software Engineering. The design process, Design fundamentals, Effective modular design, Data design, Architectural design, Procedural design, Design documentation. (4)

7. **Data – Flow Oriented Design**: Design and information flow, Design process consideration, Transform analysis, Transaction analysis, Design Heuristics, Design postprocessing, design optimization. (3)

8. **Data oriented Design methods**: Design and Data structures, Design process considerations, Jackson system development, Data structured system development. (3)

9. **Software quality assurance**: Software quality and software quality assurance, software reviews, formal technical reviews, Software quality metrics, formal approaches to SQA, Software reliability, A software quality assurance approach. (5)

10. **Software Testing techniques**:
Software testing fundamentals, White box testing, Basis path testing, Control structure testing, Black box testing, Automated testing tools. (3)

11. **Software testing Strategies**: Strategic approach to Software testing, Lodegration testing, Validation testing, System testing, Debugging. (3)

12. **Complexity, storage & processing time analysis**: Introduction, Complexity measures, Memory requirements, processing time. (2)

13. **Computer Aided Software Engineering**: What is CASE? Building blocks for CASE, A taxonomy of CASE Tools, Business System planning tools, Support tools, Analysis and design tools, Programming tools, Integration and Testing tools, Prototyping tools Maintenance tools. (5)

Reference Books:-

1. Software Engineering “A Practitioner’s Approach” - Roger S. Pressman (MGH Int.)
2. Software Engineering.- Shooman (MGH).
3. Software Engineering – Jones.
4. An integrated approach to software engineering – Pankaj Jalota (Narosa Publishing House)