



Program: B. Tech-ECE

Year: Session: 2011 – 2012

Scheme and Evaluation Pattern

S.No	Course No.	Subject	Periods			Evaluation			External Exam	Total Marks
			L	T	P	Sessional				
						CT	TA	Total		
Semester:5th										
Theory										
1.	TEC-501	Automatic Control Systems	3	1	0	30	20	50	100	150
2.	TEC – 502	Digital Signal Processing	3	1	0	30	20	50	100	150
3.	TEC – 503	VLSI Technology	3	1	0	30	20	50	100	150
4.	TEC – 504	Advanced Microprocessors	3	1	0	30	20	50	100	150
5.	TEC – 505	Antenna And Wave Propagation	3	1	0	30	20	50	100	150
6.	TCS – 507	Concepts of Programming and OOPs	2	1	0	15	10	25	50	75
Practical/Design										
1.	PEC -551	Advanced Microprocessors Lab.	0	0	2	0	0	25	25	50
2.	PCS-554	Concepts of Programming and OOPs (C++, Java) Lab.	0	0	2	0	0	0	25	25
3.	PEC-552	DSP Lab.	0	0	2	0	0	25	25	50
4.		Discipline	0	0	2	0	0	50	0	50
Semester: 6th										
Theory										
S.No	Course No.	Subject	Periods			Evaluation			External Exam	Total Marks
			L	T	P	Sessional				
						CT	TA	Total		
1.	TEC – 601	Microwave Techniques	3	1	0	30	20	50	100	150
2.	TEC - 602	VLSI Circuit Design	3	1	0	30	20	50	100	150
3.	TEC – 603	Telecommunication Switching Systems	3	1	0	30	20	50	100	150
4.	TEC - 604	Digital Communication	3	1	0	30	20	50	100	150
5.	TCS – 607	Data Structures Using C++	3	1	0	30	20	50	100	150
6.	THU – 608	Principles of Management	2	1	0	15	10	25	50	75
Practical/Design										
1.	PEC-651	Digital Communication Lab.	0	0	2	0	0	25	25	50
2	PCS-654	Data Structure Lab.	0	0	2	0	0	0	25	25
3.	PEC-652	Microwave Lab.	0	0	2	0	0	25	25	50
4.		Discipline	0	0	2	0	0	50	0	50

TEC- 501 AUTOMATIC CONTROL SYSTEMS

UNIT 1

INTRODUCTION TO OPEN LOOP AND CLOSED LOOP CONTROL SYSTEMS: feedback characteristics of control systems, Mathematical Representation of physical systems Electrical, Mechanical, Hydraulic, Thermal systems, Block diagram algebra and signal flow graphs, Mason's gain formula. (5)

UNIT 2

TIME DOMAIN ANALYSIS: Standard Test Signals, Time response of First, Second and Higher order systems, Performance Indices. (4)

ERROR ANALYSIS: Static and Dynamic Error Coefficients, Effect of adding poles and zeroes to the system, response of P, PI, and PID controllers. (7)

UNIT 3

CONCEPT OF STABILITY: Concept of stability, Asymptotic and conditional stability, Routh-Hurwitz Criterion, Root Locus technique (Concept and construction) (7)

FREQUENCY RESPONSE ANALYSIS: Correlation between time and frequency response, polar and inverse polar plots, Nyquist stability criterion, Bode plots. All pass and minimum phase systems, M and N circle. (7)

UNIT 4

DESIGN THROUGH COMPENSATION TECHNIQUES: Realization of lag, lead and lag-lead compensators, Design of closed loop control system using root locus and Bode plot Compensation (5)

ROBUSTNESS. Uncertainty and performance weights. Robust stability test. Robust performance test. Loop shaping necessary and sufficient conditions. (3)

UNIT 5

STABLE VARIABLE ANALYSIS: Introduction, State space representation, State modes of linear systems, State equations, transfer matrices, diagonalization solution of state equations, controllability and observability, effect of pole zero cancellation in transfer function. (5)

BASIC NON-LINEAR ANALYSIS: Linearization, describing function and phase plane methods, stability concepts and Lyapunov functions. (3)

SUGGESTED BOOKS:

1. B C Kuo, Automatic Control Systems; John Wiley (India)
2. Control System, N C Jagan, BSP, Hyderabad
3. I J Nagrath & M Gopal, Control System Engineering; New Age International publishers.
4. Dr D Ganesh Rao, Control System; Sanguine Technical Publisher, Bangalore
5. K Ogata, Modern Control Engineering; PHI.

TEC-502 DIGITAL SIGNAL PROCESSING

UNIT 1

DISCRETE FOURIER TRANSFORM: Frequency Domain Sampling: The Discrete Fourier Transform Frequency Domain Sampling and Reconstruction of Discrete-Time Signals. The Discrete Fourier Transform (DFT). The DFT as a linear Transformation. Relationship of the DFT to Other Transforms. Properties of the DFT: Periodicity, Linearity, and Symmetry Properties. Multiplication of two DFTs and Circular Convolution. Additional DFT Properties. Frequency analysis of signals using the DFT. Introduction to MATLAB. (Coding of Implementation of LTI using DFT)

UNIT 2

EFFICIENT COMPUTATION OF DFT: Efficient Computation of the DFT: FFT Algorithms, Direct Computation of the DFT. Radix-2 FFT algorithms. Efficient computation of the DFT of two real sequences, computations, efficient computation of the DFT of $2N$ -Point real sequences. (Coding of FFT algorithms)

UNIT3

FILTER STRUCTURES: Direct form (I & II), LATTICE for FIR & IIR Filters.

UNIT4

DESIGN OF DIGITAL IIR FILTERS: Impulse invariant and bilinear transformation techniques for Butterworth and chebyshev filters; cascade and parallel. (Coding of Butterworth and chebyshev filters)

DESIGN OF FIR FILTERS:- windowing, optimum approximation of FIR filters, multistage approach to sampling rate concession. Design of Hilbert transforms. (Coding of windowing for FIR Filters)

UNIT5

ADAPTIVE WIENER FILTER AND LMS ALGORITHM: Application of adaptive filtering to echo cancellation and equalization.

APPLICATION OF DSP AND CODING: Audio and Video coding, MPEG coding standardization, DCT, Walsh and Hardmard Coding.

SUGGESTED BOOKS:

1. Proakis, J.G. & Manolakis, D.G., "Digital Signal Processing: Principles Algorithms and Applications", Prentice Hall (India).
2. Apte, " Digital Signal Processing", 2nd Edition, John Wiley (India),2009.
3. Rabiner, L.R. and Gold B., "Theory and applications of DSP", PHI.
4. Thomas J, Cavichhhi, "Digital Signal Processing", John Wiley & Sons
5. Roman KUC, Digital Signal Processing, BSP HYderabad

TEC-503 VLSI TECHNOLOGY

UNIT 1.

Introductin to VLSI Technology: Classification if ICs, Scale of integration, semiconductor and hybrid ICs Features of ICs,

CRYSTAL GROWTH: monolithic and hybrid ICs, crystal growth, Czochralski technique of crystal growth, wafer preparation and specifications, testing, measurements of parameters of crystals, Fabrication steps,

OXIDATION: Theory of growth of Silicon di oxide layer, calculation of SiO₂ thickness and oxidation kinetics, Dry wet and high pressure oxidation, plasma oxidation, properties of oxidation, defects induced due to oxidation.

UNIT 2.

EPITAXIAL PROCESS: Epitaxy and its concept, Growth kinetics of epitaxy, epitaxial growth, Low-temperature epitaxy, Si-epitaxy- growth chemistry of Si epitaxial layer, autodoping apparatus for epitaxial layer, apparatus for epitaxy, MBE system

DIFFUSION PROCESS: Diffusion models of solid, Ficks theory of diffusion, Solution of Fick's law, diffusion parameters measurements schemes, Ion implantation- Scattering phenomenon, range theory, channeling, implantation damage, ion-implantation systems, Annealing

UNIT 3

LITHOGRAPHY: photolithography and pattern transfer, Optical and non optical lithigraphy, electron, X-ray and ion-beam lithography, contact/proximity and projection printers, alignment.

Photoresist and ETCHING:Types of photoresist, polymer and materials, Etching- Dry & Wet etching, basic regimes of plasma etching, reactive ion etching and its damages, lift-off, and sputter etching.

UNIT 4

METALLIZATION: Applications and choices, physical vapor deposition, patterning, problem areas.

VLSI PROCESS INTEGRATION: PMOS,NMOS and CMOS IC technology, MOS memory IC technology, bipolar IC fabrication.

UNIT 5

ASSEMBLY TECHNIQUE AND PACKAGING: Package types, packaging design consideration, VLSI assembly technologies.

YIELD AND RELIABILITY: Yield loss in VLSI, yield loss modeling, reliability requirements, accelerated testing.

SUGGESTED BOOKS:

1. S.M. Sze (Ed.) / VLSI Technology / M Hill. 1988.
2. R. K. SINGH /VLSI (Technology, Design & Basic Of Micro Elec.), Kataria & Sons
3. S.A. Campbell / The Science and Engineering of Microelectronic Fabrication / Oxford University Press
4. Microelectronic Circuits International Student Edition by Sedra / Smith

TEC -504 MICROPROCESSORS & CONTROLLERS

UNIT 1

8-BIT MICROPROCESSOR (8085*): Architecture, addressing modes, Assembly Language Programming.

*** Programming should be covered in Labs**

16-bit Microprocessors (8086*): Architecture, Physical address, segmentation, memory, difference between 8085 & 8086, Assembler Directives.

*** Programming should be covered in Labs**

UNIT 2

DATA TRANSFER SCHEMES: Introduction, Types of transmission, 8257 (DMA), 8255 (PPI), Serial Data transfer (USART) 8251, Keyboard-Display controller (8279), Programmable Priority Controller (8259), 8253 Timer.

UNIT 3

ADVANCE MICROPROCESSORS: Introduction to 80186, 80286, 80486, Pentium Microprocessors, Introduction to Dual core, core to Duo.

UNIT 4

8051 MICRO CONTROLLER- Architecture I/O ports, memory organization in 8051, timer, serial comm.-Addressing mode, Instruction sets, Assembly Language programming.

UNIT 5

INTERFACING OF 8051 AND ITS APPLICATIONS: LEDs:, push buttons, latch connection, keyboards, 7-segment display, LCD interfacing. Different waves generation.

SUGGESTED BOOKS:

1. R.S Gaonkar: Microprocessor Architecture, Programming and Applications with 8085/8080, Penram Publication
2. Y.C. Liu and G.A. Gibson: Microcomputer Systems: The 8086/8088 Family Architecture Programming and Design, PHI 2nd Edition

TEC-505 ANTENNA AND WAVE PROPAGATION

UNIT 1

ANTENNA PRINCIPLES: Potential Functions & Electromagnetic Field, Current Elements, Radiation from Monopole & Half Wave Dipole, power radiated by current element, Radiation Pattern, radiation resistance. Directional properties of Dipole Antenna. Antenna gain, Effective Area, Antenna terminal Impedance, In Practical Antennas and Methods of Excitation, Antenna temperature and signal to noise ratio. Radiation Patten

UNIT 2

ANTENNA ARRAYS: Two point element antenna array, Horizontal patterns in broadcast arrays, Linear arrays, Multiplication of patterns, effect of the earth on vertical patterns, Binomial array, Chebyshev array.

UNIT 3

PRACTICAL ANTENNAS: Effect of antenna height, Polarization, Directivity, Aperture, Yagi-Uda, Parabolic, Horn, Log periodic antenna, loop antenna. Introduction to phase measurement; Gain measurement: Comparison Method, Near field method, Introduction to current distribution measurement, Microstrip Antenna.

UNIT 4

ANTENNA MEASUREMENT: Measurements of antenna efficiency, Measurement of noise figure and noise temperature of an antenna polarization measurement.

UNIT 5

WAVE PROPAGATION: Modes of Propagation, Plane Earth Reflection, Space wave and Surface Wave, Reflection and Refraction waves by the Ionosphere Troposphere wave. Ionosphere Wave Propagation in the Ionosphere in the ionosphere, Virtual Height, MUF, Critical Frequency, Skip Distance, Duct propagation, Space wave.

Introduction to planar (Rectangular) waveguides- Derivation of TE and TM modes, TEM mode.

SUGGESTED BOOKS:

1. Balanis," Antenna Theory: Analysis & Design" 3rd Edition, 2010, John Wiley (India).
2. Prasad, K.D./"Antenna and Wave Propagation"/ Khanna Publications.
3. Jordan Edwards C. and Balman Keith G./" Electromagnetic Waves and Radiating Systems"/PHI
4. Hayt Jr. William H./" Engineering Electromagnetics"/TMH

TCS-507 CONCEPTS OF PROGRAMMING AND OOPS

UNIT 1

UTILIZATION: Developer fundamentals such as editor, integrated programming environment, UNIX shell, modules, libraries.

PROGRAMMING FEATURES: Machine representation, primitive types, arrays and records, objects, expressions, control statements, iteration, procedures, functions, and basic I/O.

APPLICATIONS: Sample problems in engineering, science, text processing, and numerical methods.

UNIT 2

PROBLEM SOLVING WITH ALGORITHMS- Programming styles – Coding Standards and Best practices - Introduction to C Programming, Testing and Debugging. Code reviews, System Development Methodologies – Software development Models, User interface Design – introduction – The process – Elements of UI design & reports.

UNIT 3

OBJECTED ORIENTED CONCEPTS – object oriented programming, UML Class Diagrams–relationship – Inheritance – Abstract classes – polymorphism, Object Oriented Design methodology - Common Base class, Alice Tool – Application of OOC using Alice tool.

UNIT 4

RDBMS- DATA PROCESSING – the database technology – data models, ER modeling concept – notations – Extended ER features, Logical database design – normalization, SQL – DDL statements – DML statements – DCL statements, Writing Simple queries – SQL Tuning techniques – Embedded SQL – OLTP

SUGGESTED BOOKS:

1. Object oriented to C++, Shukla, Wiley India
2. Object oriented programming in C++ , Kamthane, Pearson
3. G. Dromey, How to Solve It by Computer, Prentice-Hall, Inc., Upper Saddle River, NJ, 1982.
4. Polya, G., How to Solve _It (2nd ed.), Doubleday and co. (1957).
5. Let Us C. Yashwant Kanetkar. Allied Publishers, 1998.
6. An introduction to object oriented Programming in C++, Graham Seed, BSP, Hyderabad

PEC-551 MICROPROCESSOR & CONTROLLERS LAB

1. To perform Addition/ Multiplication of two 8 bit numbers
2. To Find the maximum value in an array
3. To perform BCD to Hex conversion & Hex to BCD conversion
4. To Design Counter using timer
- 5.1. Programming with 8086 –16-bit, 32 bit multiplication/division
6. Interfacing with 8085/8086/8051 – 8255, 8253
7. Interfacing with 8085/8086/8051 – 8279,8251
8. Stepper motor interfacing, Seven Segment display interfacing using 8051

NOTE: The institution may add 2 more practical in above prescribed list.

PCS-557 CONCEPT OF PROGRAMMING & OOPs LAB.

Students should implement the following during Practical hours: (illustrative only)

1. Programs using C & OOPs Language
2. Queries using MY-SQL
3. Using Alice Tool :
 - a. Write a method for an Alice object
 - b. Condition Construct
 - c. Repetition Construct
4. Group Project

Sl. No	Course	S/W on Students Machine	Remarks
1.	Programming Fundamentals	Visual Studio .NET (2003), Turbo C	Alternate: Visual Studio 6
2.	RDBMS	My-SQL	Alternate: Oracle 9i Client

The purpose of 1hour(s) tutorial per week is to help slow learning students bring upto speed all the students. The assignments for CHSSC, Programming Fundamentals, and Relational Data base Management System will be given by the instructor which is to be completed as a part of Tutorial.

PEC-552 DIGITAL SIGNAL PROCESSING LAB

1. Sampling & Waveform Generation, Quantization
2. PCM Encoding
3. Delta Modulation
4. Digital Modulation Schemes (ASK, PSK, FSK)
5. DFT Computation.
6. Fast Fourier Transform.
7. FIR Filter implementation, IIR Filter implementation.
8. Computational Experiments with Digital bank of Filters
9. Echo Cancellation generation and Filters implementation

NOTE: The institution may add 2 more practical in above prescribed list.

TEC-601 MICROWAVE TECHNIQUES

UNIT 1

ELEMENTS OF MICROWAVE/MILLIMETER WAVE INTEGRATED CIRCUITS: classification of Transmission lines: Planar, quasi-planar and 3D structure and their properties, field distribution and range of application, Transverse transmission the techniques for multi-dielectric planar structure, Analysis of discontinuities in planar and non-planar transition line.

UNIT 2

PROPAGATION THROUGH WAVEGUIDES: Rectangular and circular waveguides solution of wave equation for TE & TM modes, degenerate and dominant modes, power transmission power loss, Excitation of wave guides, Non existence of TEM mode in waveguide, Introduction to stripline and Microstrip-line.

UNIT 3

MICROWAVE CAVITY RESONATORS: Rectangular and cylindrical cavities, Quality factor and Excitation of cavities. Microwave Components: Waveguide couplings, bends and tees, Design and circuit realization of filters, couplers, phase shifters, E-plane, H-plane and hybrid Tees, Hybrid ring wave meters: Isolators and circulators, tunable detectors, slotted line carriage, VSWR meter.

UNIT 4

MICROWAVE MEASUREMENTS: measurement of frequency, wave length, VSWR, impedance, Attenuation Low and high power radiation patterns. Limitation of Conventional active devices at microwave frequency.

UNIT 5

MICROWAVE TUBES: Klystron, Reflex klystron, magnetron, TWT, BWO: principle of operation and its performance characteristic and application.

SUGGESTED BOOKS:

1. Pozar « Microwave Engineering » 3rd edition, John Wiley (India).
2. Microwave Engg. , Radhakrishna, BSP Publication
3. Collin, R.E. Foundations for Microwave Engineering; TMH 2nd Ed.
4. Rizzi, Microwave Engineering: Passive Circuits; PHI.

TEC-602 VLSI CIRCUIT DESIGN

UNIT 1

REVIEW: Current conduction in MOSFET, Electrical Properties of MOS and BiCMOS, The Pass Transistor, CMOS.

UNIT 2

CMOS Inverter: Static CMOS inverter, layout, switching threshold and noise margin concepts and their evaluation, dynamic behavior, power consumption.

NMOS MOS pass transistor inverter.

COMBINATIONAL LOGIC: Static CMOS design, rationed logic, pass transistor logic, dynamic logic, cascading dynamic gates, CMOS transmission gate logic.

UNIT 3

SEQUENTIAL LOGIC: Static latches and registers, bi-stability principle, MUX based latches, static SR flip-flops, master-slave edge-triggered register, dynamic latches and registers, concept of pipelining, Timing issues.

UNIT 4

MEMORY AND ARRAY STRUCTURE: ROM, RAM, peripheral circuitry, memory reliability and yield, SRAM and DRAM design, flash memory, PLA,PAL, FPGA.

UNIT 5

DESIGN FOR TESTABILITY: Logic Testing, sequential Logic Testing, Guidelines to be adopted in Design for Test, Scan Designing Techniques, Built-In self Test (BIST)Techniques.

SUGGESTED BOOKS:

1. Basic VLSI Design by D.A. Pucknell & Eshraghian (PHI)
2. Modern VLSI Design Systems on Silicon by Wayne Wolf (Pearson Pub.)
3. R. K. Singh « VLSI DESIGN (With VHDL), Kataria & Sons » , 2nd Edition, 2010.

TEC-603 TELECOMMUNICATION SWITCHING SYSTEMS

UNIT 1

INTRODUCTION: Message switching, circuits switching, functions of a switching system, register-translator-senders, distribution frames, crossbar switch, a general trunking.

Transmission Systems, FDM Multiplexing and modulation, Time Division Multiplexing, Digital Transmission and Multiplexing: Pulse Transmission, Line Coding, Binary N-Zero Substitution, Digital Bi-phase, Differential Encoding, Time Division Multiplexing (T1 carrier system CCIT and DS lines) Time Division Multiplex Loops and Rings.

UNIT 2

DIGITAL SWITCHING: Switching functions, space division switching, multiple stage switching, non-blocking switches, blocking Probabilities DCS hierarchy, integrated cross connect equipment, digital switching in environment, zero loss switching.

UNIT 3

TELECOM TRAFFIC ENGINEERING: Network traffic load and parameters, grade of service and blocking probability, Traffic Characterization: Arrival Distributions, Holding Time Distributions, Loss Systems, Network Blocking Probabilities: End-to-End Blocking Probabilities, Overflow Traffic, Delay Systems: Exponential service Times, Constant Service Times, Finite Queues.

UNIT 4

NETWORK SYNCHRONIZATION CONTROL AND MANAGEMENT: Timing Recovery, Phase-Locked Loop, Clock Instability, Jitter Measurements, Systematic Jitter. Timing Inaccuracies: Slips, Asynchronous Multiplexing, Network Synchronization, U.S. Network Synchronization, Network Control, Network Management.

UNIT 5

DIGITAL SUBSCRIBER ACCESS: ISDN Basic Rate Access Architecture, ISDN U Interface, ISDN D Channel Protocol. HD-Rate Digital Subscriber Loops: Asymmetric Digital Subscriber Line, VDSL. Digital Loop Carrier Systems: Universal Digital Loop Carrier Systems, Integrated Digital Loop Carrier Systems, Next-Generation Digital Loop Carrier, Fiber in the Loop, Hybrid Fiber Coax Systems, Voice band Modems: PCM Modems, Local Microwave Distribution Service, Digital Satellite Services.

DSL Technology: ADSL, Cable Modem, Traditional Cable Networks, HFC Networks, Sharing, CM & CMTS and DOCSIS. SONET: Devices, Frame, Frame Transmission, Synchronous Transport Signals, STS I, Virtual Tributaries and Higher rate of service.

SUGGESTED BOOKS:

1. Tele communication switching system and networks - Thyagarajan Viswanath, PHI, 2000.
2. Digital telephony - J. Bellamy, John Wiley, 2nd edition, 2001.
3. Data Communications & Networks - Achyut. S.Godbole, TMH, 2004.
4. Principles of Communication Systems – H. Taub & D. Schilling , TMH, 2nd Edition, 2003.
5. Telecommunication switching, Traffic and Networks - J E Flood, Pearson Education, 2002

TEC-604 DIGITAL COMMUNICATION

UNIT 1

ELEMENTS OF DIGITAL COMMUNICATION AND INFORMATION THEORY: Model of a Digital Communication, System, Probability Theory, Entropy and Information Rate, Conditional Entropy and Redundancy, Source Coding, Fixed and Variable Length Code Words, Source Coding Theorem, Prefix free code and, Kraft Inequality, Shannon-Fano and Huffman Coding.

UNIT 2

DIGITAL BASE BAND TRANSMISSION

PCM Coding, DM, DPCM, ADPCM, Data Transfer Rate, Line Coding and Its Properties, NRZ & RZ Types, Signalling Format For Unipolar, Polar, Bipolar(AMI) & Manchester Coding Matched Filter Receiver, Derivation of Its Impulse Response and Peak Pulse Signal to noise ratio, ISI, Rectangular, sync & Raised cosine pulse comparison

UNIT 3

DIGITAL MODULATION TECHNIQUES

Gram-Schmidt Orthogonalization Procedure, Hilbert transform, Types of Digital Modulation, correlation receiver, Waveforms for Amplitude, Frequency and Phase Shift Keying, Method of Generation and Detection of Coherent & Non-Coherent Binary ASK, FSK & PSK & PSD derivation for Coherent & Non-Coherent Binary ASK, FSK & PSK. Differential Phase Shift Keying, bit error rate comparison of Digital modulation techniques

UNIT 4

ADVANCED MODULATION TECHNIQUES

Introduction to M-ary modulation techniques 16 PSK, QPSK , QAM , Continuous phase shift keying , MSK, GMSK. Direct sequence spread spectrum, processing gain Frequency hop Spread spectrum.

UNIT 5

ERROR CONTROL CODING

Error Free Communication Over a Noise Channel, Hamming code, Relation Between Minimum Distance and Minimum Distance Error Correcting & detection Capability, Linear Block Codes, Encoding and Syndrome Decoding, Cyclic Codes, , Encoder and Decoder For Cyclic Codes, Convolution Coding & Viterbi decoding, introduction to burst error correction codes

SUGGESTED BOOKS:

1. Haykin, Simon / "Communication Systems" / John Wiley / 5th Ed., 2010.
2. Taub & Schilling / "Principles of Communication Systems" / Tata McGraw-Hill /
3. Prokis J.J / "Digital Communications" / Pearson /
4. Charkrabarti, P. / "Analog Communication Systems" / Dhanpat Rai & Co.
5. Communication System, B P Lathi, BSP, Hyderabad

TCS-607 DATA STRUCTURES USING C++

UNIT 1

COMPLEXITY ANALYSIS: Time and Space complexity of algorithms, asymptotic analysis, big O and other notations, importance of efficient algorithms, program performance measurement, data structures and algorithms.

LINEAR LISTS: Abstract data type, sequential and linked representations, comparison of insertion, deletion and search operations for sequential and linked lists, list and chain classes, exception and iterator classes for lists, doubly linked lists, circular lists, linked lists through simulated pointers, lists in STL, skip lists, applications of lists in bin sort, radix sort, sparse tables.

UNIT 2

STACKS AND QUEUES: Abstract data types, sequential and linked implementations, exception handling in classes, representative applications such as parenthesis matching, towers of Hanoi, wire routing in a circuit, finding path in a maze, simulation of queuing systems, equivalence problem.

UNIT 3

HASHING: Search efficiency in lists and skip lists, hashing as a search structure, hash table, collision avoidance, linear open addressing, chains, uses of hash tables in text compression, LZW algorithm.

UNIT 4

TREES: Binary trees and their properties, terminology, sequential and linked implementations, tree traversal methods and algorithms, heaps as priority queues, heap implementation, insertion and deletion operations, heapsort, heaps in Huffman coding, leftist trees, tournament trees, use of winner trees in mergesort as an external sorting algorithm, bin packing.

UNIT 5

GRAPHS: Definition, terminology, directed and undirected graphs, properties, connectivity in graphs, applications, implementation – adjacency matrix and linked adjacency chains, graph traversal – breadth first and depth first, spanning trees.

SUGGESTED BOOKS:

1. M. T. Goodrich and R. Tamassia, *Algorithm Design: Foundations, Analysis and Internet Examples*, John Wiley & Sons, 2001.
2. Drozdek, A., "Data Structures and Algorithms in C++", Vikas Publishing House. 2002
3. Wirth, N., "Algorithms and Data Structures", Prentice-Hall of India. 1985
4. Lafore, R., "Data Structures and Algorithms in Java", 2nd Ed., Dorling Kindersley. 2007
5. Datastructure using C, Bandopadhyaya, "Data Structures, Algorithms, and Applications in Java", WCB/McGraw-Hill. 2001
6. C and datastructure, Padnabham, BSP, Hyderabad

THU-608 PRINCIPLES OF MANAGEMENT

UNIT 1

INTRODUCTION TO MANAGEMENT: Theories of management: Traditional behavioral, contingency and systems approach. Organization as a system.

UNIT 2

MANAGEMENT INFORMATION: Interaction with external environment. Managerial decision making and MIS.

UNIT 3

PLANNING APPROACH TO ORGANIZATIONAL ANALYSIS: design of organization structure; job design and enrichment; job evaluation and merit rating.

UNIT 4

MOTIVATION AND PRODUCTIVITY: Theories of motivation, leadership styles and managerial grid. Co-ordination, monitoring and control in organizations. Techniques of control. Japanese management techniques.

- Minor Project: submission of 15 pages of Case studies on above.

SUGGESTED BOOKS

1. Peter Drucker, Harper and Row: The Practice of Management.
2. Scherhorn" introduction to Management" 10th edition, John Wiley (India).
3. Staner: Management, PHI Learning.
4. Daft: Principles of Management, Cengage Learning.

PEC-651 DIGITAL COMMUNICATION LAB

To perform following experiments based on Digital communication Trainer and Using Communication Simulink:

1. To study sampling and reconstruction of the sampled signal
2. To study Delta Modulation and Adaptive Delta Modulation.
- 3 To study ASK, PSK,FSK, -modulation system.
4. To Study TDM/PCM Transmitter /Receiver.
5. To Study DHSS, FHSS.
6. To Study Error Control Coding using Simulink.
7. To Study different Line Coding Techniques.

- NOTE: The institution may add 3 more practical in above prescribed list.

PCS-604 DATA STRUCTURE LAB.

Problems in " C / C++/JAVA" using **Data Structures** involving arrays, stacks, queues, strings, linked lists, trees, graphs.

- 1) Using STACK to check matching left and right characters such as parantheses, curly braces and square brackets in a given string.
- 2) Single server queuing system and gathering statistics.
- 3) Operations on Stacks.
- 4) Sparse Matrices
- 5) Linear linked list implementation
- 6) Operations on Doubly Linked List and Circular List with a test application
- 7) Operations on Ordered Binary Trees.
- 8) Graph Traversal Techniques
- 9) Implementation of Quicksort, Mergesort and Heapsort
- 10) Operations on Binary Trees
- 11) Shortest Path Problem

PEC-652 MICROWAVE LAB.

1. Study of various microwave components and instruments like frequency meter, attenuator, detector & VSWR meter.
2. Draw V-I characteristics of microwave source like Gunn diode/ Reflex Klystron.
3. Measurement of frequency and wavelength in a rectangular waveguide.
4. Measurement of VSWR (small as well as large values) & reflection coefficient.
5. Measure unknown impedance with smith chart.
6. Draw the following characteristics of Gunn Diode
 - (i) Output power and frequency as a function of voltage
 - (ii) Square wave modulation by PIN diode.
7. Drawing polar pattern of Horn antenna.
8. To observe the action of directional coupler and its use in separating incident & reflected wave.

- NOTE: The institution may add 2 more practical in above prescribed list.



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Year: Session: 2012 – 2013

Scheme and Evaluation Pattern

S.No	Course No.	Subject	Periods			Evaluation			External Exam	Total Marks
			L	T	P	Sessional				
						CT	TA	Total		
Semester: 7th										
Theory										
1.	TEC-701	Optical Fibre Communication Systems	3	1	0	30	20	50	100	150
2.	TEC – 702	Wireless Communication Systems	3	1	0	30	20	50	100	150
3.	TEC – 703	Satellite Communication	3	1	0	30	20	50	100	150
4.	TEC-01X	ELECTIVE-I	3	1	0	30	20	50	100	150
5.	TOE-XX	Open Elective	3	1	0	30	20	50	100	150
Practical/Design										
1.	PEC -751	Project	0	0	4	0	0	50	50	100
2.	PEC-752	Industrial Interaction	0	0	2	0	0	25	25	50
3.	PEC-753	OFC & VLSI Simulation Lab.	0	0	2	0	0	25	25	50
4.		Seminar	0	0	2	0	0	50	0	50
Semester: 8th										
Theory										
S.No	Course No.	Subject	Periods			Evaluation			External Exam	Total Marks
			L	T	P	Sessional				
						CT	TA	Total		
1.	TEC - 801	Radar & Navigation	3	1	0	30	20	50	100	150
2.	TEC-802	Data Communication Networks	3	1	0	30	20	50	100	150
3.	TEC-02X	ELECTIVE-II	3	1	0	30	20	50	100	150
4.	TEC-03X	ELECTIVE-III	3	1	0	30	20	50	100	150
Practical/Design										
1.	PEC-851	Project	0	0	6	0	0	100	200	300
2	PCS-854	CAD of Electronics Lab.	0	0	2	0	0	25	25	50
3.		Discipline	0	0	2	0	0	50	0	50

ELECTIVE-I

- TEC 011 Digital System Design Using VHDL**
- TEC 012 Artificial Neural Networks and Fuzzy Logic**
- TEC 013 Principles of Secure Communication**
- TEC 014 Mobile Computing**

ELECTIVE-II

- TEC 021 Spread Spectrum Systems**
- TEC 022 Reliability Engineering**
- TEC 023 Selected Topics in Communication**
- TEC 024 Digital Image Processing**

ELECTIVE-III

- TEC 031 Random Signal Theory**
- TEC 032 Optical Networks**
- TEC 033 Adaptive Signal Processing**
- TEC 034 Embedded Systems**

TEC-701 OPTICAL FIBRE COMMUNICATION SYSTEMS

UNIT 1

INTRODUCTION: Demand of Information Age, Block Diagram of Optical fiber Communication System, Technology used in OFC System, Structure and types of Fiber, modes and Configuration, mode theory for circular guide modal equation, modes in optical fiber, linearly polarized modes, attenuation factors, pulse broadening in optical fiber, single mode fiber, mode field diameter, single distortion in single mode fiber, Derivation of material dispersion and waveguide dispersion. Attenuation, Signal Degradation in Optical Waveguides, Pulse Broadening in Graded index fiber Waveguides, Mode Coupling.

UNIT 2

OPTICAL SOURCES:

LED: Visible LED, Infrared LED, LED structure and configuration, Loss mechanism, Application of LED, operating Characteristics materials for Visible LED.

LASER: Principle of LASER Action, Efficiency of LASER Diode, principles and structures, index guided and gains guided lasers, mode separation, quantum well laser, laser modulation.

UNIT 3

OPTICAL DETECTORS: Optical Absorption in semiconductors, Types of Photo Diodes, Principle of photo detection, working and structures of p-i-n and APD photo detectors, noises in photo detectors, SNR, detector response time effects, comparison of various photo detectors.

UNIT 4

ANALYSIS AND PERFORMANCE OF OPTICAL RECEIVER: Receiver Sensitivity, Photodiode for optical receiver, Optical Receiver Design, recent receiver circuits, System configuration and power budget.

UNIT 5

OPTICAL NETWORKS: WDM concepts and principles, passive components, SONET/SDH networks, performance of WDM.

SUGGESTED BOOKS

1. Optical Fiber Communications – Gerd Keiser, Mc Graw-Hill International edition, 3rd Edition, 2000.
2. Optical Communication- R. K. Singh, Katson books, 2004.
3. Optical Fiber Communications – John M. Senior, PHI, 2nd Edition, 2002.
4. Fiber Optic Communication Systems – Govind P. Agarwal , John Wiley, 3rd Edition, 2004.
5. Text Book on Optical Fibre Communication and its Applications – S.C.Gupta, PHI, 2005.
6. Fiber Optic Communications – D.K. Mynbaev , S.C. Gupta and Lowell L. Scheiner, Pearson Education, 2005
7. Fiber Optic Communications – Joseph C. Palais, 4th Edition, Pearson Education, 2004

UNIT 1

SERVICES AND TECHNICAL CHALLENGES: Types of Services, Requirements for the services, Multipath propagation, Spectrum Limitations, Noise and Interference limited systems, Principles of Cellular networks, Multiple Access Schemes.

UNIT 2

WIRELESS PROPAGATION CHANNELS : Propagation Mechanisms (Qualitative treatment), Propagation effects with mobile radio, Channel Classification, Link calculations, Narrowband and Wideband models, propagation models, Path loss components.

UNIT 3

WIRELESS TRANSCEIVERS: Structure of a wireless communication link, Modulation and demodulation – Quadrature/4-Differential Quadrature Phase Shift Keying, Offset-Quadrature Phase Shift Keying, Phase Shift Keying, Binary Frequency Shift Keying, Minimum Shift Keying, Gaussian Minimum Shift Keying, Power spectrum and Error performance in fading channels.

UNIT 4

SIGNAL PROCESSING IN WIRELESS SYSTEMS : Principle of Diversity, Macro-diversity, Micro-diversity, Signal Combining Techniques, Transmit diversity, Equalizers- Linear and Decision Feedback equalizers, Review of Channel coding and Speech coding techniques.

UNIT 5

ADVANCED TRANSCEIVER SCHEMES

Spread Spectrum Systems- Cellular Code Division Multiple Access Systems- Principle, Power control, Effects of multipath propagation on Code Division Multiple Access, application of Orthogonal Frequency Division Multiplexing in GSM, IS-95, IS-2000 and Third Generation Wireless Networks and Standards

SUGGESTED BOOKS:

1. Andreas.F. Molisch, "Wireless Communications", John Wiley – India, 2006.
2. Simon Haykin & Michael Moher, "Modern Wireless Communications", Pearson Education, 2007.
3. Rappaport. T.S., "Wireless communications", Pearson Education, 2003.
4. Gordon L. Stuber, "Principles of Mobile Communication", Springer International Ltd., 2001.
5. Andrea Goldsmith, Wireless Communications, Cambridge University Press, 2007.

UNIT 1

OVERVIEW OF SATELLITE SYSTEMS, ORBITS AND LAUNCHING METHODS: Frequency Allocations, Intelsat, U.S. Domsats, Polar Orbiting Satellites, Problems, Kepler's Law, Definitions of Terms for Earth-orbiting Satellites, Orbital Elements, Effects of a Nonspherical Earth, Atmospheric Drag, Inclined Orbits ,Calendars , Universal , Sidereal Time, Julian Dates , The Orbital Plane – The Geocentric-, Topcentric-Horizon , The Sub-satellite Point – Predicting Satellite Position.

UNIT 2

GEOSTATIONARY ORBIT & SPACE SEGMENT: Antenna Look Angels, The Polar Mount Antenna, Limits of Visibility, Near Geostationary Orbits, Earth Eclipse of Satellite, Launching Orbits ,Problems ,Power Supply, Attitude Control, Spinning Satellite Stabilization Momentum Wheel Stabilization, Station Keeping, Thermal Control, Transponders, Wideband Receiver, , Power Amplifier, Antenna Subsystem, Morelos, Advanced Spacecraft.

UNIT 3

EARTH SEGMENT & SPACE LINK: Equivalent Isotropic Radiated Power, Transmission Losses, Free-Space Transmission, Feeder Losses, Antenna Misalignment Losses, Fixed Atmospheric and Ionospheric Losses, Link Power Budget Equation, System Noise, Antenna Noise, Amplifier Noise Temperature, Amplifiers in Cascade , Noise Factor, Noise Temperature, Overall System Noise Temperature, Carrier-to-Noise Ratio, Uplink, Saturation Flux Density, The Earth Station HPA, Downlink, Output Back off, Effects of Rain, Uplink rain-fade margin, fade margin, Combined Uplink and Downlink C/N Ratio, Intermodulation Noise.

UNIT 4

SATELLITE ACCESS: Single Access – Preassigned FDMA, Demand-Assigned FDMA, SPADE System. Bandwidth-limited a Power-limited TWT amplifier operation, FDMA downlink analysis. TDMA : Reference Burst; Traffic Date, Frame Efficiency and Channel capacity, preassigned TDMA, Demand assigned TDMA, Speech Interpolation and Prediction, Downlink analysis for Digital transmission. Companion of uplink Power requirements for FDMA & TDMA.

UNIT 5

DIRECT BROADCAST SATELLITE SERVICES: Introduction – Orbital Spacings – Power Rating and Number of Transponders – Frequencies and Polarization – Transponder Capacity –Home Receiver Outdoor Unit (ODU) – Home Receiver Indoor Unit (IDU) – Downlink Analysis – Uplink -Problems - Satellite Mobile Services – VSATs – Radarsat – Global Positioning Satellite System – Orbcomm.

SUGGESTED BOOKS:

1. Dennis Roddy, Satellite Communications, McGraw-Hill Publication Third edition 2001
2. Timothy Pratt – Charles Bostian & Jeremy Allmuti, Satellite Communications, John Willy & Sons
3. Wilbur L. Pritchards Henri G.Snyder Hond Robert A.Nelson, Satellite Communication Systems Engineering, Pearson Education Ltd., Second edition 2003.

PEC-753 OFC & VLSI SIMULATION LAB

Design of following ckt using appropriate software like VHDL/ FPGA and OFC kits.

- 1) 3-input NAND gate.
- 2) Half adder, Full Adder
- 3) D-Latch, T Flip Flop
- 4) Serial in-serial out shift register, Bidirectional shift Register
- 5) 3 Bit synchronous counter
- 6) To set up Fiber Optic Analog link.
- 7) To set up fiber Optic Digital link.
- 8) Measurement of Propagation loss and numerical aperture.
- 9) Characterization of laser diode and light emitting diode.

- NOTE: The institution may add 2 more practical in above prescribed list.

UNIT 1

INTRODUCTION TO VHDL: VHDL description, combinational networks, modeling flip-flop using VHDL, VHDL model for multiplexer, compliance and simulation of VHDL, codes, modeling a sequential machine, variables, signals and constants, arrays VHDL operators, VHDL functions, VHDL procedures, packages and libraries, VHDL model for a counter. Attributes, transport and inertial delays, operator over loading, multi valued logic and signal resolution, IEEE-1164, standard logic, generic, generates statements, synthesis of VHDL codes.

UNIT 2

DESIGN OF NETWORKS FOR ARITHMETIC OPERATIONS: Design of serial adder with accumulator, state graph for control networks design of binary multiplier, multiplication of signed binary numbers, design of binary divider.

DIGITAL DESIGN WITH SM CHART: state machine charts, derivation of SM charts, realization of SM charts, implementation of dice game, alternative realization of SM charts using microprogramming.

UNIT 3

FLOATING POINT ARITHMETIC: Representation of floating point numbers, floating point multiplication, and other floating point operations.

DESIGNING WITH PROGRAMMABLE GATE ARRAYS AND COMPLEX PROGRAMMABLE LOGIC DEVICES: Xilinx 3000 series FPGAs, Xilinx 4000 series FPGAs, using one hot state assignment.

UNIT 4

MEMORY MODELS FOR MEMORIES AND BUSES: Static RAM, a simplified 486 bus model, interfacing memory to microprocessor bus

UNIT 5

DESIGN EXAMPLES: UART design, description of MC68HC05 microcontroller, design of microcontroller CPU, and complete microcontroller design.

SUGGESTED BOOKS:

1. Charles H Roth Jr, "Digital System Design using VHDL", Thomson Learning, 02.
2. Stephen Brown & Zvonko Vranesic, "Fundamentals of digital logic design with VHDL", TMH, 2nd Ed., 2007.
3. Jhon F Wakerly, "Digital design", PHI, 4th Ed.

Unit-I

Neural Networks-1(Introduction & Architecture): Neuron, Nerve structure and synapse, Artificial Neuron and its model, activation functions, Neural network architecture: single layer and multilayer feed forward networks, recurrent networks. Various learning techniques; perception and convergence rule, Auto-associative and hetro-associative memory

Unit-II

Neural Networks-II (Back propagation networks): Architecture: perceptron model, solution, single layer artificial neural network, multilayer perceptron model; back propagation learning methods, effect of learning rule co-efficient ;back propagation algorithm, factors affecting back propagation training, applications.

Unit-III

Fuzzy Logic-I (Introduction) : Basic concepts of fuzzy logic, Fuzzy sets and Crisp sets, Fuzzy set theory versus probability theory, Fuzzy set theory and operations, Properties of fuzzy sets, Fuzzy and Crisp relations, Fuzzy to Crisp conversion.

Unit-IV

Fuzzy Logic –II (Fuzzy Membership, Rules) : Membership functions, interference in fuzzy logic, fuzzy if-then rules, Fuzzy implications and Fuzzy algorithms, Fuzzyfications & Defuzzifications, Fuzzy Controller,

Unit-V

Application of Neural Network and Fuzzy logic: Application of neural network, case study, Inverted pendulum, Image processing. Introduction to neuro & fuzzy logic controller.

SUGGESTED BOOKS:

1. Jacek M. Zurada, 'Introduction to Artificial Neural Systems', Jaico Publishing home, 2002.
- 2 . Timothy J. Ross, 'Fuzzy Logic with Engineering Applications', 2nd John Wiley (India), 1997.

UNIT 1

Direct Sequence Spread Spectrum Systems: Model of SS digital communication system, direct sequence spread spectrum signal, error rate performance of the decoder, processing gain and jamming margin, uncoded DSSS signals, applications of DSSS signals in anti-jamming, low detectability signal transmission, code division multiple access and multipath channels, effect of pulsed interference on DSSS systems, Generation of PN sequences using m sequence and Gold sequences, excision of narrowband interference in DSSS systems, acquisition and tracking of DSSS system.

UNIT 2

Frequency Hopped Spread Spectrum Systems: Basic concepts, slow and fast frequency hopping, performance of FHSS in AWGN and partial band interference, FHSS in CDMA system, Time hopping and hybrid SS system, acquisition and tracking of FH SS systems.

UNIT 3

Cryptographic Techniques: Classical encryption technique, Symmetric cipher model, cryptography and cryptanalysts, Substitution techniques, transposition techniques

UNIT 4

Block Cipher and Data Encryption Standard : Block cipher principle, data encryption standard (DES) strength of DES, differential and linear cryptanalysts, block cipher design principles, simplified advanced encryption standard (S-AES), multiple encryption and triple DES, Block cipher modes of operation, stream ciphers and RC4 algorithm

UNIT 5

Public Key Cryptography: Prime numbers, Fermat and Euler's theorem, Chinese remainder theorem, discrete algorithms, principles of public key cryptosystems, RSA algorithm, key management Diffie-Hellman key exchange, message authentication requirements and functions.

SUGGESTED BOOKS:

1. Digital Communication by J.G. Proakis McGraw Hill 2nd Ed.
2. Cryptography and Network Security by W. Stallivgs 4th Ed., PHI
3. Digital Communication by Simon Haykin, Wiley.
4. Principle of Communication systems by Taub & Schilling TMH.
5. Cryptography and secure Communications by M.Y. Rhee, Mc Graw Hill

UNIT 1**INTRODUCTION TO NETWORK TECHNOLOGIES AND CELLULAR COMMUNICATIONS: WLAN:**

Infrared vs. radio transmission, Infrastructure and ad hoc networks, IEEE 802.11. Bluetooth- User scenarios, Physical layer, MAC layer, Networking, Security. Link management GSM-Mobile services, System architecture, Radio interface, Protocols, Localization and calling, Handover, Security, and New data services.

MOBILE COMPUTING (MC): Introduction to MC, novel applications, limitations, and architecture

UNIT 2

(WIRELESS) MEDIUM ACCESS CONTROL: Motivation for a specialized MAC (Hidden and exposed terminals, Near and far terminals) , SDMA, FDMA, TDMA, CDMA.

MOBILE NETWORK LAYER: Mobile IP (Goals, assumptions, entities and terminology, IP packet delivery, agent advertisement and discovery, registration, tunneling and encapsulation, optimizations), Dynamic Host Configuration Protocol (DHCP).

UNIT 3

MOBILE TRANSPORT LAYER: Traditional TCP, Indirect TCP, Snooping TCP, Mobile TCP, Fast retransmit/fast recovery, Transmission /time-out freezing, Selective retransmission, Transaction oriented TCP.

DATABASE ISSUES: Hoarding techniques, caching invalidation mechanisms, client server computing with adaptation, power-aware and context-aware computing, transactional models, query processing, recovery, and quality of service issues.

UNIT 4

DATA DISSEMINATION: Communications asymmetry, classification of new data delivery mechanisms, push-based mechanisms, pull-based mechanisms, hybrid mechanisms, selective tuning (indexing) techniques.

Mobile Ad hoc Networks (MANETs): Overview, Properties of a MANET, spectrum of MANET applications, routing and various routing algorithms, security in MANETs.

UNIT 5

PROTOCOLS AND TOOLS: Wireless Application Protocol-WAP. (Introduction, protocol architecture, and treatment of protocols of all layers), Bluetooth (User scenarios, physical layer, MAC layer, networking, security, link management) and J2ME.

SUGGESTED BOOKS:

1. Stojmenovic and Cacute, "Handbook of Wireless Networks and Mobile Computing", Wiley, 2002, ISBN 0471419028.
2. Jochen Schiller, "Mobile Communications", Addison-Wesley. second edition, 2004.
3. Reza Behravanfar, "Mobile Computing Principles: Designing and Developing Mobile Applications with UML and XML", ISBN: 0521817331, Cambridge University Press, October 2004.

UNIT 1

RADAR SIGNAL MODELS: Amplitude models, distributed target forms of range equation, radar cross section, statistical description of radar cross section, Swerling model, Clutter, signal to clutter ratio, temporal and spatial correlation of clutter, noise model and signal to noise ratio, frequency models, Doppler shift, simplifies approach to Doppler shift, stop and hop assumption, spatial model, variation with angle, variation with range, projections, multipath, spectral models.

UNIT 2

RADAR WAVE FORMS: Waveform matched filter of moving targets, ambiguity function, ambiguity function of the simple matched pulse filter for the pulse burst, pulse by pulse processing, range ambiguity, Doppler response and ambiguity function of the pulse burst. Introduction to Synthetic Aperture Radar (SAR)

UNIT 3

DETECTION FUNDAMENTALS: Radar detection as hypothesis testing, Neyman-Pearson detection rule, likelihood ratio test, threshold detection of radar signals, non-coherent integration of non-fluctuating targets, Albersheim and Shnidaman equations, Binary integration

UNIT 4

RADIO DIRECTION FINDING: loop direction finder, goniometer, errors in direction finding, **RADIO RANGES:** LF/MF four course radio ranges, VOR, ground equipment & receiver, VOR errors.

HYPERBOLIC SYSTEM OF NAVIGATION: LORAN & Decca DME & TECAN

UNIT 5

AIDS TO APPROACH AND LANDING: ILS & GCA & MLS **DOPPLER NAVIGATION:** Doppler frequency, Doppler radar equipment, CW & FMCW Doppler radar, frequency trackers, Doppler range equation.

SATALLITE NAVIGATION SYSTEM: transit system, NAVSTAR, GPS, basic principles of operation, signal structure of NAVSTAR broadcasts, data message, velocity determination, accuracy of GPS & differential navigation, NAVSTAR receiver.

SUGGESTED BOOKS:

1. Fundamentals of radar signal processing, Mark A Richards, TMH.
2. Elements of Electronics Navigation, N. S. Nagraja, TMH.
3. Radar principles, Peebles Jr. P. Z., Wiley, NY.

TEC-802 DATA COMMUNICATION NETWORKS

UNIT 1

INTRODUCTION: Switching systems, network hardware and software, Layering, design issues for layering, reference models and their comparison, example networks

PHYSICAL LAYER: Transmission media and channel impairments, modulation, multiplexing, digital channels, mobile telephone systems

UNIT 2

DATA LINK LAYER: Design issues, framing, error control, elementary data link protocols and sliding window protocols, HDLC, data link layer in internet.

MEDIUM ACCESS CONTROL: Channel allocation problem, MAC protocols- Aloha, CSMA, collision free protocols, limited contention protocol. Ethernet, IEEE 802.3 standard. Repeaters, bridges, routers and gateways.

UNIT 3

NETWORK LAYER: Design issues, VC and datagram subnets, routing algorithms for wired and wireless hosts, congestion prevention policies, load shedding. Connectivity of networks, connectionless internetworking, internetwork routing, fragmentation.

IP protocols, IP addressing, OSPF, IPv6.

UNIT 4

TRANSPORT LAYER: Transport service and primitives, Addressing, connection establishment and release, flow control, buffering, multiplexing and crash recovery. Introduction of UDP. Modeling TCP connection management, TCP congestion control. Performance issues

UNIT 5

DNS name space and DNS server, overview of www, http. Introduction of cryptography, substitution cipher and transposition cipher, DES, cipher methods, public key algorithms. Social issues- privacy, freedom of speech, copy right

SUGGESTED BOOKS:

1. Forouzan, B.A., "Data Communication and Networking", 4th Ed., Tata McGraw-Hill.
2. Tanenbaum, A.S., "Computer Networks", 4th Ed., Pearson Education.
3. Stallings W., "Data and Computer Communication", 8th Ed., Prentice-Hall.
4. Kurose, J.F. and Ross, K.W., "Computer Networking: A Top-Down Approach Featuring the Internet", 3rd Ed., Addison Wesley.

PCS-854 CAD OF ELECTRONICS LAB.

1. Design, simulation and analysis of two input NAND and NOR gate.
2. Design, simulation and analysis of Push Pull Amplifier.
3. Design, simulation and analysis of NMOS and CMOS inverter.
4. Design, simulation and analysis of Differential amplifier.
5. Design, simulation and analysis of Full Adder, Sub-tractors circuit.
6. Design, simulation and analysis of Up/ Down, Mod-m counter.
7. Design, simulation and analysis of 512X8 ROM.
8. Design, simulation and analysis of Static/ Dynamic hazards removal circuits.

NOTE: The institution may add 5 more practical in above prescribed list.

UNIT 1

INTRODUCTION: Introduction to spread spectrum, spread spectrum techniques, Direct sequence system, frequency hopping systems, pulse FM(chirp) system, hybrid systems

UNIT 2

CODING FOR COMMUNICATION AND RANGING- Property of codes for spread spectrum, Autocorrelation and cross correlation of codes, composite codes, code selection and signal spectra, error detection and correlation codes.

UNIT 3

MODULATION AND DEMODULATION – Balance modulator, quadric-phase modulator, frequency synthesis for spread spectrum modulation, in line and heterodyne correlation, base band recovery, phase lock loop, COSTAS loop, FM feedback, PDM and FH demodulators.

UNIT 4

NEED FOR SYNCHRONIZATION: types of synchronizers, RF link- Noise figure, co-channel users, dynamic range and AGC, propagation medium, overall transmitter and receiver design.

UNIT 5

TEST AND EVALUATION OF SPREAD SPECTRUM SYSTEM- selectivity, sensitivity, jamming margin, synch acquisition, processing gain. Transmitter measurements.

SUGGESTED BOOKS:

1. R. C. Dixon, "Spread spectrum systems with commercial application", John Wiley, 3rd Ed.
2. H. Taube and D. L. Schilling, "Principles of Communication systems", Tata Mc-Graw Hill, 2nd Ed. Reprint 2007.

UNIT 1

INTRODUCTION: Definition of reliability, quality, availability, maintainability, types of failures, various parameters of system effectiveness, concept of failure modes, difference between MTTR and MTTF.

UNIT 2

RELIABILITY MATHEMATICS: Classical set theory, Boolean algebra, sample space, definition of probability, basic properties of probability, conditional probability, and random variables.

PROBABILITY DISTRIBUTION: Exponential distribution, gamma distribution, binomial distribution, normal distribution and weibull distribution.

UNIT 3

RELIABILITY DATA ANALYSIS: The reliability function, bathtub curve, data collection, storage & recovery of data, component reliability from test data, linear hazard model & exponential hazard model.

UNIT 4

SYSTEM RELIABILITY: Systems with components in series, systems with components in parallel, series –parallel systems, Fault tree techniques, K-out of m systems.

UNIT 5

ELECTRONICS SYSTEM RELIABILITY: Reliability of electronic components, component types and failure mechanics, circuit and system aspects, reliability of electronic system design, parameter variation and tolerance.

SUGGESTED BOOKS:

1. Practical Reliability Engineering/ *Patrick D. T., O'Connor* / John Wiley & Sons 4th edition.
2. Reliability Engineering/ *E. Balagurusamy* / Tata McGraw- Hill.

TEC-023 SELECTED TOPICS IN COMMUNICATION

UNIT 1

Software defined radio; Cognitive radio: Definition, spectrum management, computational intelligence, architecture and radio resource management.

UNIT 2

Review of third generation cellular systems and standards, multicarrier modulation and multiple access techniques; Broadband wireless access, OFDMA and mobile WiMAX.

UNIT 3

Space-time wireless communications, linear diversity techniques, space-time coding; MIMO detection and channel estimation, iterative detection and decoding, MIMO-OFDM; Smart antennas; Ultra wideband communication.

UNIT 4

Advanced physical and MAC layer alternatives for wireless PAN, LAN, MAN and cellular networks; Mobile ad hoc and wireless sensor networks, adaptive link, MAC and network layer, energy efficiency and cross-layer design.

UNIT 5

Wireless capacity and channel state estimation, network capacity, information theory and network architecture, capacity of ad hoc networks; Wireline and wireless cooperation strategies, multi-antenna relaying, cooperative diversity, cooperative physical layer architecture.

SUGGESTED BOOKS:

1. Fette, B., "Cognitive Radio Technology", Elsevier. 2006
2. Mitola III, J., "Cognitive Radio Architecture: The Engineering Foundation of Radio XML", Wiley-Interscience. 2006
3. Giannakis, G.B., Hua, Y., Stoica, P. and Tong, L., "Signal Processing Advances in Wireless and Mobile Communications", Vol.1 and Vol. 2, Prentice- Hall. 2001
4. Pietrzyk, S., "OFDMA for Broadband Wireless Access", Artech House. 2006
5. Siwiak, K. and McKeown, D., "Ultra-wideband Radio", John Wiley & Sons. 2004
6. Paulraj, A., Nabar, R. and Gore, G., "Introduction to Space-Time Wireless Communications", Cambridge University Press. 2003
7. Gilsic, S.G., "Advanced Wireless Networks: 4G Technology", John Wiley & Sons. 2006

UNIT 1

INTRODUCTION: Fundamental steps in DIP, elements of DIP, Simple image model, Sampling & quantization, basic relationships between Pixels, Color image model.

UNIT 2

IMAGE TRANSFORMS: One-dimensional & Two-dimensional DFT, Cosine, Sine, Hadamard, Haar, and Slant & KL transforms.

IMAGE ENHANCEMENT: Introduction, Point operations, Histogram modeling, spatial operations, Transform operations

UNIT 3

IMAGE RESTORATION: Introduction, Image observation models, Inverse & Wiener filtering, difference between enhancement & restoration Restoration-spatial filtering, Noise reduction in frequency domain.

UNIT 4

IMAGE COMPRESSION: Introduction, Pixel coding, Predictive coding, Transform coding, Inter-frame coding.

UNIT 5

IMAGE SEGMENTATION: Introduction, Spatial feature extraction, Transforms features, Edge detection, Boundary extraction, Segmentation techniques.

- **Minor Project:** submission of 15 pages of MATLAB Program on above.

SUGGESTED BOOKS:

1. Digital Image Processing, Rafael C. Gonzales Richard E Woods, 2nd Ed. TMH
2. Pratt " Digital Image Processing" 4th Edition, John Wiley(India)
3. Fundamentals of Digital Image Processing, Anil K Jain.

UNIT 1

THEORY OF PROBABILITY: Axioms of probability: set theory, probability space, conditional, probability Repeated Trials: Combined experiments, Bernoulli trials, Bernoulli's Theorem.

UNIT 2

CONCEPT OF RANDOM VARIABLE: Introduction, distribution and density functions, specific random variables, conditional distributions.

FUNCTIONS OF ONE RANDOM VARIABLE: function and distribution of random variable, mean and variance, moments, characteristic functions.

UNIT 3

TWO RANDOM VARIABLES: Bivariate distributions, one function of two random variables, two functions of two random variables, joint moments, joint characteristic functions, conditional distributions Multiple random variables, sequences of random variables

UNIT 4

CONCEPT OF STOCHASTIC PROCESSES: Definition, systems with stochastic inputs, power spectrum, discrete-time processes.

RANDOM WALKS AND OTHER APPLICATIONS: random walks, Poisson points and shot noise, cyclostationary Processes, band-limited processes and sampling theory, deterministic signals in noise.

SPECTRAL REPRESENTATION AND ESTIMATION: factorization and innovations, finite-order systems and state variables, spectral representation of random processes, ergodicity, spectrum estimation

UNIT 5

MEAN SQUARE ESTIMATION: prediction, filtering and prediction, Kalman filters. Entropy: Basic concepts, random variables and stochastic processes, MEM.

MARKOV CHAIN: introduction, higher transition probabilities and the Chapman-Kolmogorov equation, classification of states, stationary distributions and limiting probabilities, transient states and absorption probabilities, branching processes. Markov processes and Queueing theory: introduction, Markov processes, queueing theory.

SUGGESTED BOOKS:

1. Probability, Random Variables and Stochastic Processes/A. Papoulis & S. U. Pillai/4th ed./TMH
2. Probability, Random Variables & Random Signal Principles/Peyton Z. Peebles, Jr./TMH

TEC 032 OPTICAL NETWORKS

UNIT 1

INTRODUCTION: Introduction to Optical Networks Characteristics of Optical Fiber (Emphasis on Non Linear Characteristics) , Timing & Synchronization.

UNIT 2

COMPONENTS: Couplers, Isolators & Circulators, Multiplexers & Filters, Optical Amplifiers, Tunable Lasers, Switches, Wavelength Converters

UNIT 3

NETWORKS: SONET/SDH- Multiplexing, SONET/ SDH Layers, Frame Structure, Frame Structure, Physical Layer, Elements of a SONET/SDH Infrastructure. ATM - Functions of ATM, Adaptation Layers, Quality of Service, Flow Control, Signaling and Routing . WDM Network Elements, Optical Line Terminals, Optical Line Amplifiers, Optical Add/ Drop Multiplexers, Optical Cross Connects.

UNIT 4

WDM NETWORK DESIGN: Cost Trade-offs, Light path Topology Design, and Routing and wavelength assignment problems, Dimensioning Wavelength Routing Networks, Network Survivability Basic Concepts, Protection in SONET/SDH, Protection in IP networks, Optical Layer Protection, Different Schemes, Interworking between Layers Access Networks, Network Architecture Overview, Enhanced HFC, FTTC.

UNIT 5

OPTICAL SWITCHING: OTDM, Synchronization, Header Processing, Buffering, Burst Switching. Deployment Considerations

SUGGESTED BOOKS:

1. Ramaswami, Rajiv & Sivarajan, Kumar N. / "Optical Networks a Practical perspective"/ Morgan Kaufmann Publishers / 2nd Ed.
2. Black, Uyles / "Optical Networks Third Generation Transport Systems"/ Pearson Educations

UNIT 1

INTRODUCTION: Definition and characteristics, general properties open and closed loop adaptation.

UNIT 2

ADAPTIVE LINEAR COMBINER: General description, input signal and Weight vectors, desired response and error performance function, gradient and minimum mean square, alternative definition of gradient, decorrelation of error and input components.

UNIT 3

THEORY OF ADAPTATION WITH STATIONARY SIGNALS: Input correlation matrix, Eigen values and eigenvectors of the correlation matrix, and their geometrical significance. Basic ideas of gradient search methods, gradient search by Newton's method and method of steepest descent, gradient component estimation by derivative measurement, effects of gradient noise, on weight vector solution, excess MSE, time constant and mis-adjustment, performance comparison of Newton and S.D. methods.

UNIT 4

ADAPTIVE ALGORITHMS: Least mean square algorithm, convergence, learning curve noise in Weight vector misadjustment and performances of LMS algorithms, sequential regression algorithm, adaptive recursive LMS algorithm, random search algorithm.

RECURSIVE LEAST SQUARE ALGORITHM: Preliminaries, matrix inversion lemma, exponentially weighted RLS algorithm, update recursion for the sum of weighted error squares, convergence analysis of RLS algorithm

UNIT 5

ADAPTIVE FILTER STRUCTURES: Lattice structures, all poles and all zeroes versions, adaptive lattice predictor. Lattice LMS algorithms, and lattice SER algorithms, adaptive filters with orthogonal signals, DFT and lattice preprocessors.

ADAPTIVE FILTER APPLICATIONS: (i) Adaptive modeling and systems identification. (ii) Inverse adaptive modeling, equalization and deconvolution

SUGGESTED BOOKS:

1. Adaptive Signal Processing, Widrow and Stearns, Pearson Education
2. Adaptive Filter Theory, Simon Haykin, Pearson Education

UNIT 1

INTRODUCTION: Embedded systems and its applications, Embedded Operating system, Design parameters of an embedded system and its significance, design life cycle, tools introduction, hardware and software partitioning and co-design.

UNIT 2

HARDWARE FUNDAMENTALS FOR THE EMBEDDED DEVELOPERS : Digital circuit parameters- Open collector outputs Tristate outputs I/O sinking and Sourcing, PLD's, Watchdog Timers, Hardware design and development.

CUSTOM SINGLE PURPOSE PROCESSORS: Optimizing program, FSM, Data path & FSM.

GENERAL PURPOSE PROCESSORS AND ASIP'S (Application Specific Instruction set Programming): Software and operation of general purpose processors-Programmers View Development Environment-ASIPs Microcontrollers-DSP Chips.

UNIT 3

INTRODUCTION TO MICROCONTROLLERS AND MICOPROCESSORS: Embedded versus external memory devices, CISC and RISC processors, Harvard and Von Neumann Architectures.

RTOS -Tasks, states, Data, Semaphores and shared data, Operating system services, Message queues, Mailboxes.

UNIT 4

ADVANCED PROCESSOR-(only architectures) 80386, 80486, ARM and DUAL CORE, Core to DUO, i3, i5, i7 (References)

COMMUNICATION BASICS: Microprocessor Interfacing I/O Addressing, Direct memory access, Arbitration, multilevel bus architecture, Serial protocols, Parallel protocols and wireless protocols.

UNIT 5

REAL WORLD INTERFACING: LCD, Stepping Motor, ADC, DAC, LED, Push Buttons, Key board, Latch Interconnection, PPI.

SUGGESTED BOOKS:

1. Embedded System Design-Frank Vahid/Tony Givargis, John Willey@2005.
2. Microcontroller (Theory and Applications) Ajay V Deshmukh, Tata McGraw-Hill@2005.
3. An Embedded Software Primer-David E.Simon, Pearson Education @ 1999.

REFERENCES:

1. The 8051 Microcontroller and embedded systems-Muhammad Ali Mazidi and Janice Gillispie.
2. Microcontrollers (Architecture, Implementation & Programming) Kenneth Hintz, Daniel Tabak, Tata McGraw-Hill@2005.
3. 8051 Microcontrollers & Embedded Systems 2nd Edition-Sampath Kr, Katson Books2006.

UTTRAKHAND TECHNICAL UNIVERSITY, DEHRADUN

LIST OF OPEN ELECTIVES

Effective from the session – 20010-11

[List of Open Elective of 7th Semester for B.Tech. Civil/Electrical/Electrical and Electronics/Mechanical & Allied Courses/Manufacturing Technology/Electronics and Communications & Allied Courses/ Instrumentation and Control & Allied Courses/Computer Science and Engineering & Allied Courses/ Information Technology & Allied Courses/ Agriculture (Old)/ Biotechnology/Marine Engg./Biomedical Engg. Courses.]

S.No.	P.Code	Subject	Dept.
1.	TOE 01	Non-conventional Energy Resources	Electrical
2.	TOE 02	Reliability Engineering	Electrical
3.	TOE 03	Environment & Ecology	Civil
4.	TOE 04	Geographic Inf. System (GIS) Technology & its Applications	Civil
5.	TOE 05	Entrepreneurship Development Programme	Humanities
6.	TOE 06	Ancient Indian Culture	Humanities
7.	TOE 07	Human Values	Humanities
8.	TOE 08	Quality System & Management	Mechanical
8.	TOE 09	Condition Monitoring & Diagnostics	Mechanical
10.	TOE 10	Value Engineering	Mechanical
11.	TOE 11	Nanotechnology	Mechanical
12.	TOE 12	Solar Energy	Mechanical
13.	TOE 13	Human Resource Management	Mechanical
14.	TOE 14	Advance Material Science	Mechanical
15.	TOE 15	Industrial Instrumentation	Instrumentation & Control
16.	TOE 16	Biomedical Engineering	Instrumentation & Control
17.	TOE 17	Fundamentals of Coding Theory	Electronics & Communication
18.	TOE 18	Consumer Electronics	Electronics & Communication

20.	TOE 20 Human Computer Interaction	Electronics & Communication
21.	TOE 21 I T in Business	Computer Science
22.	TOE 22 Artificial Intelligence in Manufacturing	Information Technology
23.	TOE 23 Health, Hospital and Equipment Management	Manufacturing Technology
24.	TOE 24 Introduction to Medical Physics	Biomedical Engineering
25.	TOE 25 Modern Control System	Biomedical Engineering
26.	TOE 26 Mechatronics	Electrical
27.	TOE 27 SCADA & Energy Management System	Electrical
		Electrical

Note: The students will choose any one subject of the course of other than their Engineering

Branch.

TOE-01 NON-CONVENTIONAL ENERGY RESOURCES

1. INTRODUCTION

Various non-conventional energy resources- Introduction, availability, Classification, relative merits and demerits.

2. SOLAR CELLS:

Theory of solar cells. solar cell materials, solar cell power plant, limitations.

3. SOLAR THERMAL ENERGY:

Solar radiation flat plate collectors and their materials, applications and performance, focussing of collectors and their materials, applications and performance; solar thermal power plants, thermal energy storage for solar heating and cooling, limitations.

4. GEOTHERMAL ENERGY:

Resources of geothermal energy, thermodynamics of geo-thermal energy Conversion-electrical conversion, non-electrical conversion, environmental Considerations.

5. MAGNETO-HYDRODYNAMICS (MHD):

Principle of working of MHD Power plant, performance and limitations.

6. FUEL CELLS:

Principle of working of various types of fuel cells and their working, performance and limitations.

7. THERMO-ELECTRICAL AND THERMIONIC CONVERSIONS:

Principle of working, performance and limitations.

8. WIND ENERGY:

Wind power and its sources, site selection, criterion, momentum theory, classification of rotors, concentrations and augments, wind characteristics. performance and limitations of energy conversion systems.

9. BIO-MASS:

Availability of bio-mass and its conversion theory.

10. OCEAN THERMAL ENERGY CONVERSION (OTEC):

Availability, theory and working principle, performance and limitations.

11. WAVE AND TIDAL WAVE:

Principle of working, performance and limitations. **Waste Recycling Plants**

References:

1. Andra Gabdel, "A Handbook for Engineers and Economists".
2. A. Mani , "Handbook of Solar radiation Data for India".
3. Peter Auer, "Advances in Energy System and Technology". Vol. 1 & II Edited by Academic Press.
4. F.R. the MITTRE, "Wind Machines" by Energy Resources and Environmental Series.
5. Frank Kreith, "Solar Energy Hand Book".

6. N. Chermisinog and Thomes, C. Regin, "Principles and Application of Solar Energy".
7. N.G. Calvert, " Wind Power Principles".
8. W. Palz., P. Chartier and D.O. Hall, " Energy from Biomass".

TOE – 02

RELIABILITY ENGINEERING

1. Introduction:

Definition of reliability, types of failures, definition and factors influencing system effectiveness, various parameters of system effectiveness.

2. Reliability Mathematics :

Definition of probability, laws of probability , conditional probability, Bay's theorem; various distributions; data collection, recovery of data, data analysis procedures, empirical reliability calculations.

Reliability:

3.

Types of system- series, parallel, series parallel, stand by and complex; development of logic diagram, methods of reliability evaluation; cut set and tie-set methods, matrix methods event trees and fault trees methods, reliability evaluation using probability distributions, Markov method, frequency and duration method.

Reliability Improvements:

4.

Methods of reliability improvement, component redundancy, system redundancy, types of redundancies-series, parallel, series - parallel, stand by and hybrid, effect of maintenance.

Reliability Testing:

5.

Life testing, requirements, methods, test planning, data reporting system, data reduction and analysis, reliability test standards.

1. R.Billintan & R.N. Allan, "Reliability Evaluation of Engineering and Systems", Plenum Press.
2. K.C. Kapoor & L.R. Lamberson, "Reliability in Engineering and Design", John Wiley and Sons.
3. S.K. Sinha & B.K. Kale, "Life Testing and Reliability Estimation", Wiley Eastern Ltd.
4. M.L. Shooman, "Probabilistic Reliability, An Engineering Approach", McGraw Hill.
5. G.H.Sandler, "System Reliability Engineering", Prentice Hall.

TOE-03

ENVIRONMENT AND ECOLOGY

1. Environment:

Environment and its components, pollution of environment by human activity, kinds of pollution.

Water Quality:

Measure of water quality, water quality standards, water treatment; waste water transport and treatment, sludge treatment and disposal.

Air Quality:

Sources and effects of air pollution, major air pollutants, air quality control, treatment of emissions, dispersion of air pollutants.

Solid waste:

Collection of refuse, removal and transport, disposal of refuse.

Noise Pollution:

Effect of noise on human health and its control.

2. Ecology:

Ecology and Ecosystems, concept of ecological imbalances, physical and climate factors, biotic components, energy and material flows in ecosystems, human influence on ecosystems.

Conservation of Natural Resources: water resources, mineral resources, agricultural and forestry resources, agriculture soil and need of nutrients, fertilizers and pesticides.

Brief introduction about environmental legislation and environmental audit.

References:

1. Vesilind, " Introduction to Environmental Engineering," Thomson Asia Pvt. Ltd. Singapore.

UNIT – 1

Definition of GIS, Cartography and GIS, GIS database: spatial and attribute data; Spatial models: Semantics, spatial information, temporal information, conceptual models of spatial information, representation of geographic information: point, line and area features, topology,

UNIT - 2

Raster and vector data, raster to vector data conversion, map projection, analytical transformation, rubber sheet transformation, manual digitizing and semi-automatic line following digitizer; Remote sensing data as an input to GIS data;

UNIT - 3

Attribute database: scale and source of inaccuracy; GIS functionality; data storage and data retrieval through query, generalization, classification, containment search within a spatial region;

UNIT - 4

Overlay: arithmetical, logical and conditional overlay, buffers, inter visibility, aggregation; Network analysis;

UNIT - 5

Applications of GIS in planning and management of utility lines and in the field of environmental engineering, geotechnical engineering, transportation engineering and water resources engineering.

References:

1. Geographic Information Systems: A Management Perspective, by Stan Arnoff, WDL Publications.
2. Fundamentals of Spatial Information Systems by Robert Laurini and Derek Thompson, Academic Press.
3. Geographical Information Systems, Vo. I and II edited by Paul Longley, M.F. Goodchild, et.al, John Wiley and Sons, Inc. 1999.

TOE-05 ENTREPRENEURSHIP DEVELOPMENT PROGRAMME

Entrepreneur-definition. Growth of small scale industries in developing countries and their positions vis-a-vis large industries; role of small scale industries in the national economy; characteristics and types of small scale industries; demand based and resources based ancillaries and sub-control type.

Government policy for small scale industry; stages in starting a small scale industry.

Project identification- assessment of viability, formulation, Evaluation, financing, field-study and collection of information, preparation of project report, demand analysis, material balance and output methods, benefit cost analysis, discounted cash flow, internal rate of return and net present value methods.

Accountancy- Preparation of balance sheets and assessment of economic viability, decision making, expected costs, planning and production control. quality control. marketing, industrial relations. sales and purchases, advertisement, wages and incentive, inventory control, preparation of financial reports, accounts and stores studies.

The financial functions, cost of capital approach in project planning and control. Economic evaluation, risk analysis, capital expenditures, policies and practices in public enterprises. profit planning and programming, planning cash flow, capital expenditure and operations. control of financial flows, control and communication.

Laws concerning entrepreneur viz, partnership laws, business ownership, sales and income taxes and workman compensation act.

Role of various national and state agencies which render assistance to small scale industries.

Reference:

1. Joseph, L. Massod, " Essential of Management", Prentice Hall of India.

TOE-06 ANCIENT INDIAN CULTURE

UNIT – 1

Main features of Indian Culture

- (a) The orient list view
- (b) The nationalist view

- (c) The Marxist view
- (d) Analysis and formulations

Principal Components – historical and archeo-ethic perspective

- (a) Indian Civilization
- (b) Vedic culture
- (c) Tribal and folk culture
- (d) Foreign elements

UNIT - 2

Impact of integrating, disintegrating and proliferating forces of History.

- (a) Eras of political unification
- (b) Foreign invasions
- (c) Regional conflicts
- (d) Religious movements
- (e) Trade and Dissemination

UNIT - 3

Ideas and Institution

- a. Political
- b. Social
- c. Economic
- d. Religious

UNIT - 4

Achievements in Arts, Science and Technology

- (a) Literature
- (b) Art and Architecture
- (c) Music and Dance
- (d) Astronomy and Mathematics

UNIT - 5

Values and disvalues

- a. Humanism and spiritualism
- b. Ashinsa
- c. Altmism
- d. Caste
- e. Unsociability
- f. Religious suicide and superstition
- g. Degradation of women and prostitution.

References:

1. Ghose Aurobindo, Foundations of Indian culture.
2. Pande, G.C., Foundations of Indian culture, 2 Vols.
3. Coomarswami, dance of Siva
4. Thapar Ramila, Ancient Indian Social History

5. R.s. Sharma, (ed.), Indian Society Historical Probing, People's Publishing House, New Delhi, 1977.
6. Kossambi, Introduction to Indian History.
7. Altekar, A.S., State and Government in Ancient India.
8. Altekar, A.S., Position of Women in Hindu Civilization
9. Prakash, Om, conceptualization and History.
10. Bartam, A.I., Wonder that was India.

TOE 07 HUMAN VALUES

Introduction

- 1. Nature of value crisis in the contemporary Indian society and the larger human community.**
2. Meaning and nature of values; holistic view of life and its value.
3. Conceptualizing 'good' life and its value dimensions.

Unit-I : Material and Societal value

- 1. Role of material values in promoting human wellbeing.**
2. Role of Science and technology; problems of material development.
3. Socio-political ideologies for promoting material wellbeing
4. Conceptualizing 'good' society and 'social goods'
5. Justice as a societal value.
6. Democracy and rule of law.
7. Values in the Indian Constitution.
8. Gandhian concepts of good society; gram swaraj, sarvodaya, antyodaya

Unit-II : Psychological and Aesthetic Values

1. Humanistic psychology; meaning of 'personhood'

3. Mental health
4. Psycho-spiritual Indian concepts.
5. Areas and nature of aesthetic experiences.
6. Nature of beauty; aesthetic sensibilities.

Unit-III : Ethical and Spiritual Values

1. Bases for moral judgments : customary morality, religious morality, reflective morality.

2. Some principles of ethics; ethical canons and their significance in modern life.
3. Virtue ethics; personal virtues for the modern times.
4. Ethics of duty and ethics of responsibility.
5. Factors to be considered in making ethical judgements: motives, means and consequences.
6. Spirituality and spiritual values : spiritual wisdom of the Upanishads; Buddha's view.
7. Science, materialism and spirituality.
8. Spirituality in the modern times.

QUALITY SYSTEM & MANAGEMENT

1. Introduction:

Definition, need of quality systems, role of quality standards, stages of quality assurance systems. quality charts, control charts for variables and attributes, acceptance sampling.

2. Quality Systems:

Overall responsibility for progress of quality systems. quality manuals, procedures and role of auditing, auditing for conformance versus quality for effectiveness, auditing a tool for quality improvement.

ISO 9000 quality systems, British Standards BS5750/ISO 9000 origin of standards, requirements, issues associated with implementation.

Registration and accreditation in quality system-certification, approval, registration of leading accessors.

References:

1. Mohamod Isiri, " Total Quality Management for Engineers".
2. Juran, J., " Quality Planning and Analysis, Mc-Graw Hill.
3. James R. Evans,& J.W. Dean," Total Quality-management, Organisation and Strategy," Thomson Asia Pvt. Ltd., Singapore.

TOE – 09**CONDITION MONITORING & DIAGNOSTICS****Unit-I**

Productivity, Quality circle in Maintenance, Reliability, Reliability assurance, Maintainability vs. Reliability.
Failure analysis, Equipment downtime analysis, breakdown analysis.

Unit-II

Maintenance type, Breakdown maintenance, Corrective maintenance, Opportunity maintenance, Routine maintenance, Preventive and predictive maintenance, Condition based maintenance systems, Design-out maintenance.

Unit-III

Equipment health monitoring, Signals, Online & off-line monitoring, Visual & temp. Monitoring, Leakage monitoring, Lubricant monitoring.

Unit-IV

Ferrography, Spectroscopy, Crack monitoring, Corrosion monitoring, thickness monitoring. Noise/sound monitoring, Smell/Odour monitoring, Thermography.

Unit-V

Vibration-characteristics, Vibration monitoring-causes, identification, measurement of machine vibration.

C.M.of lubes and hydraulic systems, C.M. of pipe lines, Selection of C.M. techniques Advantages.

VALUE ENGINEERING

An Overview

Definition, value engineering recommendations, programmes, advantages.

Approach of function

Evaluation of function, determining function, classifying function, evaluation of costs, evaluation of worth, determining worth, evaluation of value.

VE Job Plan

Introduction, orientation, information phase, speculation phase, analysis phase.

Selection of Evaluation of VE Projects

Projects selection, Methods selection, value standards, application of VE methodology.

Versatility of VE

VE operation in maintenance and repair activities, value engineering in non hardware projects.

Initiating A VE Programme

Introduction, training plan, career development for VE specialities.

Fast Diagramming

Cost models, life cycle costs.

VE level of Effort

VE team, Co-ordinator, designer, different services, definitions, construction management contracts, value engineering case studies.

References:

1. Tufty Herald, G., "Compendium on Value Engineering" The Indo American Society, First Edition, 1983.
2. Miles, L.D., "Techniques of Value Engineering and Analysis:", McGraw Hill second Edition, 1972.
3. Khanna, O.P., "Industrial Engineering and Management", Dhanpat Rai & Sons, 1993.

TOE-11

NANOTECHNOLOGY

A. Introduction to Physics of Solid State:

1. **Structure:**Size dependence of properties; crystal structures, face centered cubic nanoparticles; Tetrahedrally bounded semiconductor structures; lattice vibrations.
2. **Energy bounds:** Insulators, semiconductor and conductors; Reciprocal space; Energy bounds and gaps of semiconductors; effective masses; Fermi Surfaces.
3. **Localized Particles:** Acceptors and deep traps; mobility; Excitons.

B. Methods of Measuring Properties:

1. Structure : Atomic Structures; Crystallography; Particle size determination, surface structure.
2. Microscopy : Transmission electron Microscopy; field ion microscopy Scanning Microscopy.
3. spectroscopy: Infrared and Raman Spectroscopy; Photoemission and X-ray Spectroscopy; Magnetic resonance, optical and vibrational Spectroscopy,

C. Properties of Individual Nano particles

1. Metal Nano clusters: Magic Numbers; Theoretical Modelling of Nanoparticles; Geometric Structure; Electronic Structure; Reactivity; Fluctuations Magnetic Clusters; Bullets to Nano structure.
2. Semi conducting Nanoparticles: Optical Properties; Photofragmentation; Coulombic Explosion.
3. Rare Gas & Molecular Clusters: Inert Gas Clusters; Superfluid Clusters molecular clusters.
4. Method of Synthesis: RF Plasma; Chemical methods; thermolysis; pulsed laser methods.

D. Carbon Nanoparticles:

1. **Carbon Molecule:** Nature of carbon bond; New carbon structures.
2. **Carbon Clusters:** Small carbon clusters; Discovery of C_{60} ; Structures of C_{60} , Alkali doped C_{60} ; superconductivity in C_{60} ; Large and smaller fullerenes; other buckyballs.
3. **Carbon Nano tubes:** Fabrication; structure, Electrical Properties; Vibrational properties, Mechanical Properties.
4. **Appls:** Field emission & Shielding; Computers; Fuel cells, chemicals sensors; catalysis, Mechanical reinforcement.

E. Balle Nanostructured materials:

1. Solid Disordered Nanostructure.
2. Nanostructured Crystals

F. Nanostructured Ferromagnetism

Basics of Ferromagnetism; Effect of structuring of Magnetic properties, Dynamics of Nanomagnets; Nanopore containment of magnetic particles, Nanocarbon Ferromagnets, Giant & colossal magnetoresistance; Ferrofluids.

G. Quantum Wells, Wires and Dots

Preparation of Quantum Nanostructure; Size and Dimensionality effect, Fermigas; Potential wells; Partial confinement; Excitons; Single electron Tunneling, Infrared detectors; Quantum dot laser Superconductivity.

H. Nano-machines & Nano-device

Microelectromechanical systems (MEMS) Nanoelectromechanical systems (NEMS), Fabrication, Nanodevices and Nanomachines.

Molecular & Supermolecular switches Applications areas of Nanotechnology in Engineering .

Books

1. Introduction to Nanotechnology – C.P.Poole Jr F.J. Owens
2. Introduction to S.S. Physics - (7th Edn.) Wiley 1996.
3. Microcluster Physics – S. Sugano & H. Koizuoni Springer 1998
4. Handboole of Nanostructured Materials & Nanotechnology vol.-5. Academic Press 2000

TOE 12

SOLAR ENERGY

UNIT-1

Introduction, Energy alternative, Devices for thermal collection and storage,

on, Solar radiation

geometry, Empirical equations for prediction the availability of solar radiation,
Solar radiation on tilted surfaces.

UNIT-2

Liquid flat- Plate Collectors: General performance analysis, Transmissivity-
absorptivity product and overall loss coefficient and heat transfer correlations,
Collector efficiency factor, Numericals,
Analysis of collectors similar to the conventional collector. Testing procedures,
Alternatives to the conventional collector, Numericals.

UNIT-3

Solar Air Heaters: Performance analysis of a conventional air heater, Other types
of air heaters.
Concentrating Collectors: Flat plate collectors with plane reflectors, Cylindrical
parabolic collector, Compound parabolic dish collector ,Central receiver
collector, Numericals.

UNIT-4

Thermal energy storage: Sensible heat storage, Latent heat Storage, Thermo-
chemical storage .

8

8

8

Solar distillation: Introduction, working principal of solar distillation, Thermal efficiency of distiller unit, External heat transfer, Top loss coefficient, Bottom and side loss coefficient, Internal heat transfer, Radioactive loss coefficient, connective loss coefficient, Evaporative loss coefficient, Overall heat Evaluation of distillation output, Passive solar stills, Conventional solar still, Basin construction, Thermal analysis of conventional solar still.

UNIT-5

8

Photovoltaic Systems: Introduction doping Fermi level, P-N junction characteristics, Photovoltaic effect, Photovoltaic material, Module, Cell temperature, Numericals.

Economic analysis: Introduction, cost analysis.

8

BOOKS:

1. Solar Energy: Thermal Processes, by Duffie John A, and Beckman W.A, John Wiley and Sons.
2. Solar Energy, by S.P Sukhatme, Tata Mc Graw Hill.
3. Treatise on Solar Energy, by H.P Garg, John Wiley and Sons.

TOE-13

HUMAN RESOURCE MANAGEMENT

Unit-I

Scope and Importance of Human Resource management, Historical background of Evolution of HRM and HRD in 20th century, Outlining the contemporary role for HRM in organization. Goals of HRM. (Why behavioural approach?)

8

Unit-II

Manpower as a resource in job related behaviour and individual motivation in a work setting. Various theories of human motivation, Maslow's hierarchy of needs. Needs for achievement, power and affiliation, other theories, group

Unit-III

Manpower planning and recruitment, Testing procedures and their limitations.

Reservations in jobs, pre induction training.

5

Unit-IV

Wage and salary administration-pay roll and compensation. Job analysis and job specification, other pay plans, employment contracts, special compensation plans for example personnel, effect of Financial rewards on individuals performance.

5

Goal setting and performance evaluation, promotion policy, employee satisfaction, turnover.

4

Unit-V

Assessment of training needs, forces promoting investment in HRD, Human resource development through individual and group efforts. Training analyses and training methods guidelines for individual development, job enlargement and job enrichment, job rotation, special assignment, Sponsored courses cost benefit exercise.

7

Importance of unions, industrial petitions and conflict analysis and resolution .

Relevant labour laws.

ADVANCED MATERIAL SCIENCE

UNIT I

Introduction

Solid Solution

Properties of solid solutions and alloys, types binary alloys, Thermal Equilibrium Diagrams, Cooling curves, Eutectic and peritectic alloys, Intermetallic compounds.

Heat Treatment

Heat treatment principles and processes for Ferrous and non-ferrous metals and alloys, Effect on structures and Properties.

Fatigue & Creep

Fatigue loading, Mechanisms of fatigue, fatigue curve, Fatigue tests. Design criteria in fatigue, Corrosion fatigue.

UNIT II

Corrosion and its prevention

Mechanism of corrosion, Chemical Corrosion, Electro chemical corrosion, Anodic and Cathodic protection, Forms of metallic coatings. Anodising, Phosphating.

UNIT III

Selection of materials for hazardous/ saline environment

Selection of materials of saline/ hazardous environment - Boilers, Steam and Gas turbine and Diesel engine components, Pumping, Machinery, Piping, Engine seating, Propellers and Rudders, Composition strength value and other requirements for materials used. Material Standards.

UNIT IV

Electrical and Electronics materials

Science and engineering of electrical and electronics materials such as semi-conductor, super conductor, its devices and applications.

TOE-15

INDUSTRIAL INSTRUMENTATION

Unit-1

1. Basic Measurement principles & Source of Errors.
2. Units of pressure and vacuum, different type of manometer, diaphragm gauges, bellows and force balance type sensors, bourdon gauge, and piezoelectric, capacitive and inductive pressure pickups.

Vacuum pressure measurements: McLeod gauge, pirani gauge, thermocouple gauge, Knudsen gauge ionization calibration procedures,

Unit-2

3. Temperature Measurements: Standards and calibration, Thermal expansion methods, bimetallic thermometer, Liquid-in-gas (thermocouples) common thermocouples, Resistance thermometers, Bulk semiconductor sensors, Radiation

thermometers, automatic null balance radiation thermometers. Optical parameters, Case studies of temperature controllers.

Unit- 3

4. Differential pressure flow meters: Bernoulli's theorem, pitot tube orifice, venturi, and flow nozzle. Hot wire and hot film anemometers, constant pressure drop, variable area meters (rotameter), Turbine meters. Electromagnetic flow meters, Ultrasonic flow meter. Measurement of level. Float type gauge, purge method, differential pressure method, conductive and capacitive method, and electromechanical method, use of radio scope for level measurement.

Unit-4

5. Measurement of weight: Load cell method, strain gauge, LVDT, piezoelectric, pneumatic and hydraulic load cell, null balance method.
6. Density, Viscosity, pH and conductivity measurement.

Unit-5

7. Measurement of moisture: Thermal drying method, Distillation Method, Chemical reaction Method, Electrical Method
8. Recorders: Graphic Recorders, Strip Chart Recorders, Circular-chart recorders, Multipoint Recorders and X-Y Recorders.

Text Books: --

1. Doebelin / Measurements systems: Application and Design, 4th edition / Tata Mc Graw Hill.
2. S.K Singh, / Industrial instrumentation and control / TMH 2nd edition
3. Eckman / Industrial Instrumentation / Wiley Eastern Ltd.

Reference Books: -

4. Beckwith & Beck / Mechanical Measurements / Narosa Publishers, 1988
5. Nakara / Instrumentation: measurements & Analysis / Tata Mc Graw Hill.
6. Douglas, D. Considine / Handbook of Instrumentation Measurement and Control Mc Graw Hill.

BIOMEDICAL ENGINEERING

Unit -1

1. Introduction: Specifications of bio-medical instrumentation system, Man-Instrumentation system Components, Problems encountered in measuring a living system. Basics of Anatomy and Physiology of the body.
2. Bioelectric potentials: Resting and action potentials, propagation of action potential, The Physiological potentials – ECG, EEG, EMG, ERG, EOG and Evoked responses.
3. Electrodes and Transducers: Electrode theory, Biopotential Electrodes – Surface electrodes, Needle electrodes, Microelectrodes. Biomedical Transducers.

Unit-2

4. Cardiovascular Measurements: Electrocardiography –ECG amplifiers, Electrodes and Leads, ECG recorders –Single channel, Three channel, Vector Cardiographs, ECG System for Stresses testing, Holter recording, Blood pressure measurement, Heart sound measurement. Pacemakers and Defibrillators.
5. Patient Care & Monitoring: Elements of intensive care monitoring, displays, diagnosis, Calibration & Reparability of patient monitoring equipment.

Unit-3

6. Respiratory system Measurements: Physiology of Respiratory system
.Measurement of breathing mechanism – Spirometer. Respiratory Therapy equipments: Inhalators, Ventilators &Respirators, Humidifiers, and Nebulizers & Aspirators.
7. Nervous System Measurements: Physiology of nervous system, Neuronal Communication, Neuronal firing measurements.

Unit-4

8. Ophthalmology Instruments: Electroretinogram, Electro-oculogram, Ophthalmoscope, Tonometer for eye pressure measurement.
9. Diagnostic techniques: Ultrasonic diagnosis, Eco-cardiography, Eco-encephalography, Ophthalmic scans, X-ray &Radio-isotope diagnosis and therapy, CAT-Scan, Emission computerized tomography, MRI.

Unit-5

- 10 Bio-telemetry: The components of a Bio-telemetry system, Implantable units, Telemetry for ECG measurements during exercise, for Emergency patient monitoring.
- 11 Prosthetic Devices and Therapies: Hearing Aides, Myoelectric Arm, Dia-thermy, Laser applications in medicine.

TEXT BOOKS:

1. Khandpur R.S.- Biomedical Instrumentation- TMH
2. Venkata Ram,S.K.-Bio-Medical Electronics&Instrumentation (Revised)- Galgotia.

REFERENCE BOOKS:

- 3.
- 4.
- 5.
- 6.
- 7.

Cromwell- Book of Medical Instruments-2005-New Age International
Biomedical
Instrumentation and Carr&Brown –Introduction to Biomedical Equipment Technology – Pearson
Measurements- PHI
Pandey & Kumar-Biomedical Electronics and Instrumentation. - Kataria

Webster,j.g. –Bio-
Instrumentation
,Wiley (2004)

TOE-17

FUNDAMENTALS OF CODING THEORY

Ananthi,S. –A Text

Purpose of encoding, separable binary codes, Shannon-fano encoding, noiseless coding. Shannon binary encoding, Huffman encoding, discrete coding in presence of noise.

Unit-II

Error detecting and error correcting codes, Hamming single error correcting code, Elias's iteration technique for coding.

Unit-III

Block codes, encoders and decoders for block codes, syndrome and syndrome decoding.

Unit-IV

Cyclic codes. Encoders and decoders for cyclic code, Golay code, BCH code, Reed soloman code.

Unit-V

Convolution coding, code generation, decoding of convolution code, sequential decoding, state and trellis diagram.

Text Book:

1. F. M. Reza, "An introduction to Information theory", Dover Publication Inc.
2. H. Taub and D. L. Schilling, "Principles of communication system" TMH 2nd Ed.

TOE-18**CONSUMER ELECTRONICS****UNIT 1**

Audio Systems: Microphones, Loudspeakers, Speaker baffle and enclosure, Acoustics, Mono, Stereo, Quad, Amplifying Systems, Equalisers and Mixers, Electronic Music Synthesisers, Commercial Sound, Theater Sound System

UNIT 2

Video Systems and Displays: Monochrome TV, Colour TV standards and systems, TFT, Plasma, HDTV, Digital TV, Video Telephone and Video Conferencing

UNIT 3

Domestic Appliances: Washing machines, Microwave ovens, Air- conditioners and Refrigerators, In car computers
Office Systems: FAX, Xerox, Telephone Switching System, Mobile Radio System

UNIT 4

Recording and Reproduction Systems: Disc recording and reproduction, Magnetic recording and reproduction, Video tape recording and reproduction, Video disc recording and play back, Distortion and Noise reduction in Audio and Video System

UNIT 5

Power Supplies and other systems: SMPS, UPS and Preventive Maintenance, Set

Text Books:

1. Consumer Electronics S P Bali Pearson ed 2005

TOE-19 WIRELESS & MOBILE COMMUNICATION**UNIT I**

EVOLUTION OF MOBILE RADIO COMMUNICATION FUNDAMENTALS. Large scale path loss: propagation models, reflection, diffraction, scattering, practical link budget design using path loss model. Small scale fading & multipath propagation and measurements, impulse response model and parameters of multipath channels, types of fading, theory of multi-path shape factor for fading wireless channels

UNIT II

SPREAD SPECTRUM MODULATION TECHNIQUES: Pseudo-noise sequence, direct sequence spread spectrum (DS-SS), frequency hopped spread spectrum(FHSS),performance of DS-SS, performance of FH-SS, modulation performance in fading and multipath channels, fundamentals of equalization, equalizer in communication receiver, survey of equalization techniques, linear equalizer, linear equalizer, non-linear equalization, diversity techniques, RAKE receiver.

UNIT III

INTRODUCTION TO MOBILE COMMUNICATION: Evolution of mobile communications, mobile radio systems- Examples, trends in cellular radio and personal communications.

Cellular Concept: Frequency reuse, channel assignment, hand off, Interference and system capacity, tracking and grade of service, Improving Coverage and capacity in Cellular systems.

UNIT IV

of Speech Coders for Mobile Communication, GSM Codec, RS codes for CDPD. **Multiple Access Techniques:**

FDMA, TDMA, CDMA, SDMA, Capacity of Cellular CDMA and SDMA.

UNIT V

WIRELESS SYSTEMS AND STANDARDS: Second Generation and Third Generation Wireless Networks and Standards, WLL, Blue tooth. AMPS, GSM, IS-95 and DECT

TEXT BOOK

1. T.S.Rappaport, "Wireless Communications: Principles and Practice, Second Edition, Pearson Education/ Prentice Hall of India, Third Indian Reprint 2003.

REFERENCES

1. R. Blake, " Wireless Communication Technology", Thomson Delmar, 2003
2. W.C.Y.Lee, "Mobile Communications Engineering: Theory and applications, Second Edition, McGraw-Hill International, 1998.
3. Stephen G. Wilson, " Digital Modulation and Coding", Pearson Education, 2003.

TOE- 20

HUMAN COMPUTER INTERACTION

Unit –I

User centered design of system & interfaces, anatomy and rationale of WIMP

(Window, Icon, Menus & Pointing Devices) interfaces.

Dialogue design, Presentation design, user documentation, evaluation / usability testing of user interface.

Unit –III

Ergonomics and Cognitive issues, hypertext and the World Wide Web.1

Unit –IV

User centered design, human factors in user-centered design, development & evaluation, Interactive design –rapid prototyping.

Unit –V

Designing for usability –effectiveness, learnability, flexibility, attitude and usability goals, criteria for acceptability.

References:

1. Sudifte AG , “Human Computer Interface Design” , 2nd ed, Macmillan ,1995
2. Sheiderman B Designing the user interface, “Strategies for Effective Human Computer Interaction”, 2nd ed. Addison Wesley, 1992

TOE –21

IT IN BUSINESS

Unit - I

Business Drivers IT's Competitive Potential
Strategic Alignment
Strategic Management and Competitive Strategy

UNIT – II

Rethinking Business Through IT Developing a Competitive Strategy
Interorganization Information Systems Business-To-Business Systems
Electronic Commerce and Market Systems

Unit - III

Forming a Corporate IT Strategy
Developing an Information Architecture

Unit - IV

Incorporating Business Innovation Into the Corporate IT Strategy
The Changing Role of IT In International business
The Changing Global IT Practices

Unit - V

Changing the Focus of Strategy

Trends: Beyond 2000

References:

1. Callon, Jack D., "Competitive Advantage Through Information Technology", McGraw - Hill, 1996 [CALL]
2. Tapscott, Don, "The Digital Economy", McGraw-Hill, 1996. [DIGI]

TOE –22

ARTIFICIAL INTELLIGENCE IN MANUFACTURING

UNIT I

Artificial Intelligence - Definition - Components - Scope - Application Areas;
Knowledge - Based Systems (Expert Systems) - Definition - Justification -
Structure – Characterization

UNIT II

Knowledge Sources - Expert - Knowledge Acquisition - Knowledge
Representation - Knowledge Base - Inference Strategies - Forward and
Backward Chaining

UNIT III

Expert System Languages - ES Building Tools or Shells; Typical examples of Shells. Expert System software for manufacturing applications in CAD, CAPP, MRP , Adaptive control,

UNIT IV

Robotics, Process control, Fault diagnosis, Failure Analysis; Process Selection, GT etc. Linking expert systems to other software such as DBMS, MIS, MDB.

UNIT V

Process control and Office automation. Case studies of typical applications in tool selection, Process selection, Part classification, inventory control, Process Planning etc.

References

1. Artificial Intelligent Hand book, Jhon & Andrew Kusiak.
2. Artificial Intelligent, T. Barnold.
3. Introduction to Artificial Manufacturing Export system, Dan.W. Patterson

TOE 23

HEALTH, HOSPITAL AND EQUIPMENT MANAGEMENT

UNIT - I

HEALTH SYSTEM

Health organisation of the country, the state, the cities and the region, Health Financing System, Organisation of Technical Section.

HOSPITAL ORGANIZATION AND MANAGEMENT

Management of Hospital organisation, Nursing section Medical Sector, Central Services, Technical Department, Definition and Practice of Management by Objective, Transaction Analysis Human relation in Hospital, Importance to Team Work, Legal aspect in Hospital Management.

UNIT III

REGULATORY REQUIREMENT AND HEALTH CARE CODES

FDA Regulation, joint commission of Accreditation for Hospitals, National Fire Protection Association Standard, IRPC.

UNIT IV

EQUIPMENT MAINTENANCE MANAGEMENT

Organizing Maintenance Operations, Paper Work Control, Maintenance Job, Planning Maintenance Work Measurement and Standards, Preventive Maintenance, Maintenance Budgeting and Forecasting, Maintenance Training, Contract Mainframe.

UNIT V

TRAINED TECHNICAL PERSONNEL

Function of Clinical Engineer, Role to be performed in Hospital, Man power Market, Professional Registration, Structure in hospital.

REFERENCES BOOKS

1. Cesar A. Caceres and Albert Zara, The practice of Clinical Engineering, Academic Press, 1977.
2. Webster, J.G. and Albert M. Cook, Clinical Engineering Principles and Practices, Prentice Hall Inc. Englewood Cliffs, 1979.
3. Anatomy Kelly, Maintenance planning and control, Butterworths London, 1984.
4. Hans Pfeiff, Vera Dammann (Ed.) Hospital Engineering in Developing Countries, Z report Eschborn, 1986.
5. Jacob Kline, Handbook of Bio Medical Engineering, Academic Press, San Diego 1988.
6. R.C. Goyal, Handbook of Hospital Personal Management, Prentice Hall of India, 1993.

TOE 24

INTRODUCTION TO MEDICAL PHYSICS

UNIT - I

ATOMIC

Traditional definition of atom, periodic system of elements, mechanical properties of atom, emission of light and its frequencies. Electromagnetic spectra.

Principles of Nuclear Physics — Natural radioactivity, Decay series, type of radiation and their applications, artificially produced isotopes and its application, accelerator principles; Radionuclides used in Medicine and

UNIT - II

INTERACTION WITH LIVING CELLS

Target theory, single hit and multi target theory, cellular effects of radiation, DNA damage, depression of Macro molecular synthesis, Chromosomal damage.

UNIT - III

SOMATIC EFFECT OF RADIATION

Radio sensitivity protocol of different tissues in human, LD 50/30 effect of radiation on skin, blood forming organs, lenses of eye, embryo and Endocrinal glands.

UNIT - IV

GENETIC EFFECT OF RADIATION

Threshold of linear dose effect, relationship, factors affecting frequency of radiation induced mutation, Gene controlled hereditary disease, biological effect of microwave and RF wave. Variation in dielectric constant and specific conductivity of tissues. Penetration and propagation of signals effects in various vital organs, Protection standards.

UNIT - V

PHOTO MEDICINE

Synthesis of Vitamin D in early and late cutaneous effects, Phototherapy, Photochemotherapy, exposure level, hazards and maximum permissible exposure.

LASER PHYSICS — Characteristics of Laser radiation, Laser speckle, biological effects, laser safety

REFERENCE BOOKS

1. Mosely, Non Ionising Radiation Adam Hilgar Bristol 1988.
2. Branski. S and Cherski. P 'Biological Effects of Microwave' -Hutchinson & ROSS Inc.

TOE - 25

MODERN CONTROL SYSTEM

1. Design of Control System in State Space:

Review of controllability and observability, controller design by pole placement, Ackermann's formula, design of full order and minimum order state observers, steady state error design via integral control.

2. Robust Control Systems:

Robust control. Quadratic Performance Index, state regulator and output regulator problems. control configurations, state regulator design through the Lyapunov equation, optimal state regulator through the matrix Riccati equation, model reference control

3. Optimal Control:

Basic mathematical concepts, conditions for optimality, variational calculus approach, Pontryagin's maximum principle and Hamilton Jacobi-Bellman theory, structures and properties of optimal systems.

4. Variable Structure System:

Concept of variable structure system (VSS), switching of structure in **sliding** region, VSS for control of second order system, applications of VSS in power system.

References:

1. K. Ogata, "Modern Control Engineering", Prentice Hall of India.
2. M. Gopal, "Modern Control System", Wiley Eastern.
3. B.D.O. Anderson and IB. Moore, " Optimal Control System: Linear Quadratic Methods", Prentice Hall International.
4. U. Itkis, "Control System of Variable Structure", John Wiley and Sons.
5. H. Kwakemaok and R. Sivan, "Linear Optimal Control System", Wiley Interscience.

TOE 26

MECHATRONICS

1. Mechatronics and its scope:

Sensors and transducers- Displacement, position & proximity, velocity, force, pressure and level.

Signal conditioning amplification, filtering & data acquisition.

2. Pneumatic and Hydraulic actuation systems:

Directional control valves, pressure control valves and cylinders. process control valves. Mechanical actuation system-kinematic chains, cams, geartrains. Ratchet & Pawl, dampers, bearings. Electrical actuation system. Mechanical switches- solenoid operated solid state switches, DC, AC & stepper motors.

Building blocks of Mechanical spring, mass and damper. Drives- Electrical Drives, Fluid systems, hydraulic, servo, closedloop controllers.

3. Elements of Microprocessors & Microcontrollers, Programmable **logic controllers &** Communication interface.

4. Case Studies of Mechatronic Systems:

Industrial Robot and its control

Electromechanical disc-control.

5. **Vehicle suspension Control:**

Micro mechanical systems. Computer Printer, VCR, Fax Machine, NC Machine.

References:

1. Rolf Isenmann, " Mechatronics Systems", Springer, 2005.
2. W. Bolten, "Mechatronics", Pearson Education 2003.
3. HMT Ltd, "Mechatronics;", Tata McGraw Hill 1998.

TOE 27

**SCADA & ENERGY MANAGEMENT
SYSTEM**

1. SCADA:

Purpose and necessity, general structure, data acquisition, transmission & monitoring. general power system hierachial Structure.

Overview of the methods of data acquisition systems, commonly acquired data, transducers, RTUs, data concentrators, various communication channels- cables, telephone lines, power line carrier, microwaves, fiber optical channels and satellites.

2. Supervisory and Control Functions:

Data acquisitions, status indications, majored values, energy values, monitoring alarm and event application processing. Control Function: ON/ OFF control of lines, transformers, capacitors and applications in process in industry - valve, opening, closing etc.

Regulatory functions: Set points and feed back loops, time tagged data, disturbance data collection and analysis. Calculation and report preparation.

3. MAN- Machine Communication:

Operator consoles and VDUs, displays, operator dialogues, alarm and event loggers, mimic diagrams, report and printing facilities.

4. Data basis- SCADA, EMS and network data basis.

SCADA system structure - local system, communication system and central system. Configuration- NON-redundant- single processor, redundant dual processor. multicontrol centers, system configuration.

Performance considerations: real time operation system requirements, modularization of software programming languages.

5. Energy Management Center:

Functions performed at a centralized management center, production control and load management economic dispatch, distributed centers and power pool management.

1. Torsten Cergrell, " Power System Control Technology", Prentice Hall International.
2. George L Kusic "Computer Aided Power System Analysis", Prentice Hall of India,
3. A. J. Wood and B. Woolenberg, "Power Generation Operation and Control", John Wiley & Sons.
4. Sunil S Rao, "Switehgear Protection & Control System" Khanna Publishers 11th Edition.