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Credits:3

Unit –I

Energy Scenario: Primary and Secondary Energy, Conventional and non-conventional energy, Energy Security, Energy Conservation and its importance, Energy conservation Act., Thermal Energy basics, Energy Audit its definition & methodology, Energy Audit Instruments, Benchmarking for energy performance, Energy Action Planning, Duties and responsibilities of Energy Manager; Energy financial management, Project Management, Energy monitoring and targeting, pinch technology.

Fuels and Combustions, Types of fuels, Important properties of fuels, calorific values, proximate and ultimate analysis of fuel, storage, handling & preparation of coal properties of gaseous fuels, combustion and combustion calculations, 3T's of combustion, Burners, Turndown ratio, draft.

(10 Hrs)

Unit –II

Boilers: Introduction, different types and their classification, performance evaluation of boilers, Thermal efficiency and its determination by direct and indirect method, Blow-down, boiler water treatment, external water treatment, feed water preheating, combustion air preheating, excess air control, energy saving opportunities in boilers. Fluidized bed boilers: principles of fluidization, circulating fluidized bed, bubbling bed boilers, pressurized fluid bed combustion, advantages of fluidized bed combustion boilers.

Industrial furnaces- Types & classifications of furnaces, shanky diagram, Performance and its evaluation of a typical furnace, Heat losses in a furnace, furnace efficiency, Determination using direct and indirect methods, fuel economy measures in furnaces, Heat distribution in a reheating furnace, furnace draught, optimum capacity utilization, waste heat recovery from flue gases

(12 Hrs)

Unit –III

Fans and Blowers: Difference between fans, blowers and compressors, Fan types, a centrifugal fans, arial flow fans, fan laws, fan design and selection criteria's, flow control strategies, fan performance, assessment, energy saving opportunities in fans.

Pumps & Pumping System: Types of pumps, pump curves, factors affecting pump performance, flow control strategies, Energy conservation opportunities in pumping system

(12 Hrs)

Unit –IV

Cooling Towers, flow control strategies, Energy saving options in cooling towers.

Refrigeration System: Introduction, types of refrigeration system, Performance assessment of a refrigeration system, COP, factor affecting performance, energy savings opportunities in refrigeration systems.

Compressed Air System: Compressor Type, free air delivery, efficiency of compression, leak test, energy efficiency opportunities in compressed air systems

(10 Hrs)

Recommended Books:

AUTHOR	TITLE	PUBLISHER
	Technical Literature published by Petroleum Conservation Research Association.	
Dr. Clive Beggs	Energy Management Supply & Conservation	Budsworth Heinemann- 2002
Albert Treemann & Paul Mehta	Handbook of Energy Engineering	The Fiamout Press Inc
	Website of Bureau of Energy Efficiency	

CH-7202B RUBBER TECHNOLOGY

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3 0 0

Credits:3

Unit –I

General Introduction: Basic concept & definition, Rubber Plantation & Production of Natural Rubber, Degradation & Aging of rubbers

(08 Hrs)

Unit –II

Compounding: Types of additive used, Mastication for compounding, rubber: Carbon black, Rubber compounding & mixing, plasticizer, Zinc Oxide, Sulphur accelerators, Oxidants.

(12 Hrs)

Unit –III

Vulcanisation: Vulcanisation system (EV, Semi EV, CV) , Mechanism of vulcanisation.

(10 Hrs)

Unit –IV

Synthetic Rubber: Chloroprene Rubber, Silicone Rubber, SBR, Nitrile Rubber, Butyl rubber, Polyisobutylene; PU elastomer; Fluoroelastomer, Ethylene Propylene-Diene Elastomer.

Formation of Rubber products; Hose, Belt.

(12 Hrs)

Recommended Books:

AUTHOR	TITLE	PUBLISHER
Text Books:		
M. Morton	Rubber Technology	Van Nostrand Reinhold Co. (ACS)
J.A. Briston	Rubber Materials	
Reference Books:		
G. Alliger, I.J. Sjothun	Vulcanization of Elastomers	Robert E. Krieger Pub. Co., New York
Roberts	Natural Rubber Science & Technology	

CH-7202C

PETRO-CHEMICAL TECHNOLOGY

L T P
3 0 0

Credits:3

Unit –I

Feed Stock: Feedstock for petrochemical industry and their choice for different classes of products

(10 Hrs)

Unit –II

Conversion and Recovery: Conversion processes: Cracking reforming aliglation, cooking oxidation, Per sulpherization and sulpher recovery

(10 Hrs)

Unit –III

Separation and Purification: Techniques for separation of product and their purification

(10 Hrs)

Unit –IV

Applications: Petrochemical products and their uses in other industries such a Fertilizers, synthetics, lubricants etc

(12 Hrs)

Recommended Books:

AUTHOR	TITLE	PUBLISHER
W.c. Nelson	Petroleum Refining Engineering	McGraw Hill
B.K. B.Rao	Modern Petroleum Refining Processes	Oxford IBH
P.Belov	Fundamentals of Petroleum Chemical Technology	Mir Pub. Moscow
A.L. Woddams	Chemical from Petroleum	GPC
B.K. Bhaskar Rao	A Text book on Petrochemicals	Khanna Pub. Co.

CH-7202D SEPARATION PROCESSES

L T P
3 0 0

Credits:3

Unit –I

Introduction and Chromatographic Techniques: Introduction, classification, characteristics of separation processes, General theory, Column chromatography HPLC, GLC & affinity chromatography

(10 Hrs)

Unit –II

Ion Exchange Separation Techniques: Introduction of Ion exchange resins, Ion chromatography, electro-deposition, electro-phoresis.

(10 Hrs)

Unit –III

Separation Involving Floatation Etc: Foam fractionation, Gas & Liquid floatation, Separation by thermal definition, crystallization

(10 Hrs)

Unit –IV

Membrane Separation Processes: Osmosis and reverse osmosis, dialysis and electro dialysis, filtering & sieving, introduction to liquid membrane, per evaporation

(12 Hrs)

Recommended Books:

AUTHOR	TITLE	PUBLISHER
Clifton, E. Meloan	Chemical Separations	John Wiley
Coulson Richardson	& Chemical Engineering, Vol. 2	Elsevier Publishers

CH-7202E CORROSION ENGINEERING

L T P
3 0 0

Credits:3

Unit –I

Basic Concepts: Fundamentals of corrosion, corrosion rates and measurements, corrosion monitoring

(10 Hrs)

Unit –II

Types of Corrosion, High temperature corrosion, Environmental assisted corrosion, and Microbial corrosion, corrosion in water systems, Dry and wet corrosion

(10 Hrs)

Unit –III

Corrosion Prevention: Corrosion control or prevention, inhibitors, Organic barriers (coating), Inorganic barriers (Metallic linings), Electro-chemical protection, cathodic and anodic protection, passivation, Corrosion Resistant alloys

(10 Hrs)

Unit –IV

INDUSTRIAL Application: Chemical process industries, power generation, energy conversion, environmental protection, Railways, Automobiles, Aircrafts, case study for design alternatives in material selection for corrosion protection.

Polymer in corrosion: corrosion resistant polymer and their applications, Paint, coatings, lacquers, varnishes

(12 Hrs)

Recommended Books:

AUTHOR	TITLE	PUBLISHER
H.U. Uhlig	Corrosion and corrosion Control	John Wiley and Sons Inc.
L.L. Shrier	Corrosion Vol. 1 & 2	George Newns Ltd. London
W.J. Patton	Material in Industry	Prentice Hall
F.W. Baity	Fundamentals of Engineering Metallurgy	Cassel Publications
SISCO, F.T. Advisory Editor	Pitman Metallurgical Series	Pitman Publications.

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Credits:3

Unit -I

Introduction: Basic understanding of modern separation processes such as Micro filtration, Ultra filtration and Nano filtration, Reverse Osmosis, Electro osmosis, Dialysis and Electro dialysis, Liquid and Gas permeation, Ion exchange separation and Pervaporation

(08 Hrs)

Unit -II

Mechanism: Characteristics of separation processes, Diffusion and Permeability, Membrane materials, Mechanism of transport: Transport through porous media, Solution diffusion transport, Facilitated and coupled transport, Transport through Ionomers

(06 Hrs)

Unit-III

Preparation and classification: Micro porous membrane, Asymmetric membrane, Coated asymmetric and Composite membranes. Preparation methods: Leaching, Phase inversion, Sintering, Stretching, Thermally induced phase separation, Trace etching

(08 Hrs)

Unit -IV

Characterization: Pore size and distribution, Bubble point test, Factors affecting retentively, Concentration and gel polarization, Fouling, Cleaning, Regeneration of membranes, Fuel cell, Application of membranes

(08 Hrs)

Recommended Books:**TEXT BOOKS:**

Chemical Engg. Vol. 2

Coulson and Richardson .

Synthetic Polymeric Membranes

Khulbe, Kailash C., Feng, C.Y., Matsuura, Takesi

REFERENCE BOOKS:

Polymer Science and Technology

Joel R. Fried

CS-7104A ADVANCE DATABASE MANAGEMENT SYSTEMS

L T P
3 1 0

Credits-4

UNIT-I

Introduction of DBMS: Types of DBMS and their advantages and disadvantages, Introduction of RDBMS, Types of relational query language, Normalization, Query optimization.

(12 Hrs)

UNIT-II

Database protection in RDBMS: Integrity, Concurrency control, Recovery.

Distributed Database: Concepts, structure, trade-offs.

Methods of data distribution: Fragmentation, replication, design & advance concepts of DDBMS.

(12 Hrs)

UNIT-III

Introduction to object oriented databases, Deductive databases.

Data warehousing Concepts: Architecture, Data-flows, Tools & Technologies, Data Marts

(12 Hrs)

UNIT-IV

Data Mining & Online Analytical Processing, Spatial & Multimedia databases, Mobile Computing & Mobile Databases.

(12 Hrs)

Recommended Books:

Title	Author(s)	Publisher
Text Fundamentals of Database Systems	Elmasri, Navathe	Pearson Education.
Database Concepts	Henry F. Korth, A Silberschatz	Tata Mc Graw Hill.
Reference Database Systems	Thomas Conolly, Carolyn Begg	Pearson Education.

CS-7104B CRYPTOGRAPHY

L T P
3 1 0

Credits-4

UNIT-I

Introduction: Terminology: Security, Security Attacks, Security Services, Security Mechanisms, OSI Security Architecture, A Model for Inter-network Security, Internet Standards.

(12 Hrs)

UNIT-II

Symmetric Ciphers: Symmetric Cipher model, substitution techniques, Transposition techniques, Rotor machines, Steganography, Block Cipher principles, Data Encryption standard, Strength of DES, Differential and Linear Crypto-analysis, Block Cipher Design principles

Advanced Encryption Standard: Evaluation Criteria for AES, The AES Cipher, Multiple Encryption, Triple DES, Block Cipher modes of Operation.

(12 Hrs)

UNIT-III

Key Encryption and Hash functions: Public Key Cryptography Principles, Public-Key Cryptography Algorithms, Key Management, Diffie-Hellman Key exchange, Digital Signatures, Digital signature standard, Authentication protocols, Cryptography and Message Authentication, Approaches to Message Authentication, Secure Hash Functions and HMAC.

(12 Hrs)

UNIT-IV

Network Security Applications: Authentication Applications, Kerberos, X.509 Directory Authentication Service, Public Key Infrastructure, Kerberos Encryption Techniques Electronic Mail Security, Pretty Good Privacy (PGP), S/MIME, Introduction to Firewalls.

(12 Hrs)

Recommended Books:

Title	Author(s)	Publisher
Cryptography and Network Security	Principles and practices	William Stallings, PHI.
Network Security Essentials	William Stallings	PHI
Reference		
Computer Networks	A.S. Tanenbaum	PHI

CS-7104C DIGITAL SIGNAL PROCESSING

L T P
3 1 0

Credits-4

UNIT-I

Discrete Time Signals and Systems: Classification of signals, transformation of independent variable, Concept of frequency in discrete time sinusoidal and harmonically related complex exponential, Interconnection of systems, LTI systems: properties, impulse response convolution sum, Response of LTI systems to arbitrary input; LTI systems characterized by linear constant coefficient difference equations, structures for realization of LTI systems, recursive and non recursive realization of FIR systems.

(12 Hrs)

UNIT-II

Z-Transform: Introduction Z-transform pair, properties of region of convergence (ROC) for the Z-transform, properties of Z-transform, analysis and characterization of LTI systems using Z-transforms .System functions for interconnection of LTI systems. Block diagram representation for causal LTI systems described by difference equations and rational system functions.

(12 Hrs)

UNIT-III

Discrete Fourier Transform (Dft): Frequency domain sampling and reconstruction of discrete time signals, DFT, inverse DFT (IDFT), DFT as a linear transformation, relationship of the DFT to other transforms, properties of DFT, use of DFT in linear filtering, filtering of long sequences, frequency analysis of signals, using DFT.

Fast Fourier Transform Algorithms: Direct computation of DFT, divide and conquer approach to computation of the DFT, radix-2 FFT algorithms, use of FFT algorithm efficient computation of the DFT of two real sequences, and of the DFT of a 2N point real sequence.

(12 Hrs)

UNIT-IV

Implementation Of Discrete Time Systems: Introduction, structures for FIR systems: Direct form, cascade form and lattice structure, structures for IIR systems: Direct form, cascade form, parallel form and lattice structures. Fixed point representation of numbers, errors resulting from rounding and truncation.

Design of Digital Filters: General considerations, causality and its implications, characteristics of practical frequency selective filters, design symmetric linear phase FIR filters using rectangular and hamming window.

(12 Hrs)

Recommended Books:

Title	Author(s)	Publisher
Text		
Digital Signal Processing	A.V Oppenheim and R.W.Schafer	Pearson Ed.
Digital Signal Processing	S. Salivaharan, A Vallavraj C Granapriya	TMH
Reference		
Digital Signal Processing	Proakis & Manolakis	Pearson.

CS-7104D EMBEDDED SYSTEMS

L T P
3 1 0

Credits-4

UNIT-I

Introduction Review of Embedded Hardware: Terminology, Gates, Timing Diagram, Memory, Microprocessor Buses, Direct Memory Access, Interrupts, Built instructions on the Microprocessor. Conventions used on Schematic, Interrupts, Microprocessor Architecture, Interrupt Basic, Shared Data Problem, Interrupt Latency.

(12 Hrs)

UNIT-II

PIC Micro controller & Interfacing: Introduction, CPU Architecture, Registers, Instruction Sets, Addressing Modes, Programs, Interfacing Methods, Parallel I/O Interface, Parallel Port Interface, Memory Interfacing, High Speed I/O Interfacing, Interrupts – Interrupt Service Routine – features of Interrupts – Interrupt vector & Priority, Timing Generation & Measurements, Input Capture, Output Compare, Frequency Measurement, Serial I/O Device RS232, RS485, Analog Interfacing, Applications.

(12 Hrs)

UNIT-III

Software Development & Tools: Embedded System Evolution Trends, Round – Robin, Robin with Interrupts, Function Scheduling architecture, Algorithms, Introduction to assembler, Compiler and Cross compilers and Integrated Development Environment IDE, Object Oriented Interfacing, Recursion, Debugging Strategies, Simulators.

(12 Hrs)

UNIT-IV

Real Time Operating Systems: Task And Task States, Tasks and Data, Semaphores and shared data, operating system services, Message queues, Timer Function, Events, Memory Management, Interrupt Routines in an RTOS Environment, Basic Design Using RTOS.

(12 Hrs)

Recommended Books:

Title	Author(s)	Publisher
Text Specification and Design of Embedded Systems	D. D. Gajski, F. Vahid	Prentice Hall.
Embedded systems Design	J. Gong, S. Narayan Steve Heath, Newnes	
Reference Hardware Software Co-design of Embedded Systems .	F. Balarin, Chiodo,	Academic Publishers

UNIT-I

Goals of NLP: Survey of applications, Levels of linguistic processing: morphology, syntax, semantics, Language processors: recognizers, transducers, parsers, generators, Language as a rule-based system, Language understanding as an inferential activity.

(12 Hrs)

UNIT-II

Resources for NLP: lexicons and knowledge bases, Elements of formal language theory: alphabet, string, language, grammar, productions, symbol vocabulary, generator, recognizer, procedure, Types of grammar, the Chomsky Hierarchy.

Computational morphology: lemmatization, Part-of-Speech Tagging, Finite-State Analysis.

(12 Hrs)

UNIT-III

Parsing: Definition of a parser; derivations, basic parsing strategies for context free grammars, determinism and non-determinism; decidability, data structures and algorithms for parsing, unification based grammar formalisms.

(12 Hrs)

UNIT-IV

Ambiguity and its resolution: Syntactic ambiguities and heuristics, lexical ambiguities and selectional restrictions, indeterminacy of reference

Generation and Dialogue: Syntactic generation algorithms and reversibility, text planning, modeling dialogue agents.

(12 Hrs)

Recommended Books:

Title	Author(s)	Publisher
Text Natural language understanding	Allen, J.	Redwood City.
Readings in natural language processing	Grosz, B.J., Sparck Jones	B.L. (eds)
Reference Speech and Language Processing: An Introduction to Natural Language Processing,.	Jurafsky, D. & J. Martin.	Prentice Hall

UNIT-I**Operating System services.**

Operating System classifications. Single user, multi-user, simple monitor, batch processing, Multiprogramming, Multiprocessor systems, Multitasking, time sharing, real time operation system.

Processor Management

Process Overview, process states, multiprogramming, levels of scheduler and scheduling algorithms, multiple-processor scheduling, Process, Threads, Process Scheduling objects and techniques. 12hrs

UNIT-II**Memory Management**

Partition, paging and segmentation; types of memory management schemes, virtual

memory-demand paging, Page Replacement Algorithms, allocation Algorithms, Thrashing.

12hrs

UNIT-III**File Management**

File supports, access methods, and allocation contiguous method, linked and index allocation; Directory, systems-single level, tree structured, cycle graph and general graph directory, file protection.

Resource Protection

Mechanism, policy and domain of protection, access matrix and its implementation, dynamic protection structure, protection problems, security. 12hrs

UNIT-IV**Deadlocks Characteristics**

Prevention, avoidance, detection and recovery, Concurrent Process. Precedence graph, Berntein's condition, process hierarchy, critical section, semaphores, classical process co-ordination problems 12hrs

Recommended Books

Title	Author(s)	Publisher
	Text	
Operating System Concepts	Peterson, Silberschatz	Addison Wesley
Operating Systems	Milenkovic	MacGraw Hill

UNIT-1

System Models

Introduction to systems; scientific and nonscientific systems; discrete & continuous systems; characteristics of systems ; different views of systems; Modeling of systems; physical and symbolic models; examples of models from various disciplines. Computer systems; electrical systems, economic system & inventory system.

UNIT-2

System Simulation

Continuous systems simulation; analog versus digital simulation; basic operation & notation for analog simulation; linear systems & simultaneous equation representation; digital computer simulation; simulation of a real life time –dependent system via a programming language such as Fortran/Pascal.

UNIT-3

Discrete system simulation-event, activity & process; representation of time: fixed stem vs. event-to-event model; analysis of a discrete system; generation of random number generation for microcomputers; testing of pseudo-random numbers; Monte Carlo computation; simulation of a real life discrete system.

UNIT-4

Introduction to Algorithm Analysis

Algorithm; Analyzing Algorithms; Designing Algorithms
Mathematical Foundations

Growth of functions-Asymptotic notation, standard notations & common function ;
Recurrences- substitution method, iteration method, recursion tree method, master method

Sorting and order Statistics

Recommended Books

Text		
Title	Authors	Publisher
Simulation and modeling	Liffick	TMH
System Simulation with Digital Computer	Deo	PHI
Introduction to Algorithms	Coreman	PHI
Algorithm Analysis & Design	Harwitz and Sahni,	Galgotia Publications

Reference		
Title	Authors	Publisher
Computer Simulation and Modeling System Simulation	Neelamkavil, Gorden	John-Wiley PHI
The Design and Analysis of Computer Algorithms,	Aho, Hopcaroft, Ullman	Pearson

CS-7104H Database Management System

L T P
3 1 0

Credits:04

UNIT-I

Introduction To Database Concepts

Difference between Database and non database system, Data independence, 3 level architectures, components of a database system, Example of transaction processing. Advantages and disadvantages of Database system.

Data Modeling

Data associations and Data relationships, ER Model;Design, issues, Mapping constraints, keys, ER diagram, weak entity sets, extended ER features, Design of an ER Database schema, Reduction of an ER Schema to tables. 12 hrs

UNIT-II

Database Design

Integrity Constraints: Domain constraints, Referential integrity, entity integrity, functional dependencies, pitfully in Relational database design, Decomposition, Normalization using FD's MVD's and JD's Domain key normal form, Denormalization, Approaches to database design. 12 hrs

UNIT-III

Relation Algebra

SQL & Relational Calculus Query optimization

Introduction, overview of optimization process, expression transformation, Database statistics, A divide and conquer strategy, Implementing the relational operators. 12 hrs

UNIT-IV

Transaction processing

Transaction Concept, Transaction state, Implementation of Atomicity, and durability, concurrent execution, serializability, Recoverability, implementation of isolation, transaction definition in SQL.

Overview of Backup and recovery process

Failure classification, storage structure, Recovery and atomicity, Log based recovers, shadow paging, Recovery with concurrent transaction, buffer management, failure with loss of non volatile storage, advanced recovery techniques. 12 hrs

Recommended Books

Title	Author(s)	Publisher
Text		
Database system concepts	Korth, H. F. & A Silberchatz	MGHISE
Fourth Generation Languages	Martin, James	Prentice Hall
Reference		
Introduction to database system .	Date. C.J.	Addison Wesley
Database Systems	Bipin Desai	TMH

UNIT-I

Overview of the Operating System: Operating system, purpose and basics, services, assumptions about hardware, introduction to the kernel, system concepts, kernel data structures, system administration, architecture of the unix and windows NT operating systems.

(12 Hrs)

UNIT-II

Internal representation of files: Buffer headers, structures of the buffer pool, reading and writing disk blocks, advantages & disadvantages of buffer cache, structure of regular files, directories, i-nodes, conversion of pathnames to an in order superblock, allocation of disk blocks, open read & write file, file creation, change directory & root, change owner & mode, pipes, dup, link, unlink, mounting & unmounting file systems, file system abstractions & maintenance.

(12 Hrs)

UNIT-III

The structure of processes & process control: The process states & transitions, layout of system memory, context of a process, saving the context of a process, manipulation of process address space, process creation, signals, process termination, user id of a process, changing the size of a process, the shell, process scheduling, system calls, Intercrosses communications, process tracing, network communications, sockets.

(12 Hrs)

UNIT-IV

Memory management policies: Swapping and paging, demand paging, a hybrid system with swapping and demand paging, memory management in multi user operating systems.

Multiprocessor systems: Driver interfaces, disk drivers, terminal drivers, streams, problems of multiprocess systems, semaphores, solutions with master and slave processors, solutions with semaphores.

(12 Hrs)

Recommended Books:

Title	Author(s)	Publisher
Text The design of the Unix O/S	Marrice J Back	PHI

CS-7105B REAL TIME SYSTEMS

L T P
3 1 0

Credits-4

Unit I

Typical Real Time Applications: Digital Control, High level Controls, signal Processing other Real Time Application.

Hard v/s Soft real Time Systems: Jobs & Processors (Release time, Deadlines and timing Constraints, Hard and Soft timing Constraints, Hard and Soft Real time Systems.

(12 Hrs)

Unit II

A reference Model of Real Time System: Processors and Resources, Temporal Parameters of real time workload, Periodic Task Model, Precedence constraints and Data Dependency, other type of dependencies Functional Parameters, Resource Parameters of jobs and Parameters of Resources, Scheduling Hierarchy.

Commonly Used Approaches to Real – Time Scheduling: Clock driven approaches, weighted Round – Robin Approach, Priority – Driven Approach Dynamic Vs Static System, Effective release times and deadlines, Optimality of the EDF and LST Algorithms, Challenges in Validating timings Constraints in priority Driver system, Off line Vs online Scheduling.

(12 Hrs)

Unit III

Clock Driven Scheduling: Notations and assumptions, static, Timer – Driven Scheduler, General Structure of cyclic Schedules, Cyclic executives, Improving the average Response Time of Aperiodic Jobs, Scheduling Sporadic Job's, Practical considerations and generalisation, Algorithms for constructing static schedules, Pros & Cons of clock driven scheduling.

Priority – Driven Scheduling of Periodic Tasks: Static Assumptions, Fixed – priority Vs Dynamic Priority Algorithms, Maximum Schedulable Utilization, Optimality of the RM and DM Algorithms.

(12 Hrs)

Unit IV

Multiprocessor Scheduling, Resource Access Control and Synchronization: Model of Multi processor & distributed Systems, Task Assignment, Multiprocessor Priority – Ceiling Protocol, Element of Scheduling Algorithms for End- to – End Periodic Tasks, Schedulability of Fixed – Priority End – to – End Periodic Tasks in Heterogeneous systems, Predictability and validation of Dynamic Multiprocessor systems.

Real-Time Communication: Model of Real Time Communication, Priority-based service Disciplines for switched networks, Weighted Round Robin Service Disciplines, Medium Access – Control Protocols of Broadcast networks, Internet and Resource Reservation protocols, Real – Time Protocols, Communication in Multicomputer Systems.

(12 Hrs)

Recommended Books:

Title	Author(s)	Publisher
Real Time Systems	Jane W.S. Liu	Pearson Education
Real Time Systems	C.M. Krishna, Kang G. Shin	McGraw Hill,

Unit-I

Introduction: Fundamentals of fault tolerance: safety critical systems, dependability, maintainability, fault error failure, redundancy and dependability evaluation techniques.

(12 Hrs)

Unit-II

Hardware Architectures for Fault Tolerance: Fault tolerant Architectures –high availability systems, long-life systems and critical computations, fault tolerant multiprocessors and distributed architectures-forward recovery schemes. Fault tolerance in interconnection networks. Case studies of fault tolerant multiprocessors and distributed systems.

(12 Hrs)

Unit-III

Analysis of dependability of computer systems: Application of various statistical techniques to design, prototype and operational phases, reliability estimation techniques.

(12 Hrs)

Unit-IV

Fault Tolerant Software: Design diversity, Software reliability modes, acceptance tests, exception handling System level diagnostic techniques: bounded and probabilistic models.

(12 Hrs)

Recommended Books:

Title	Author(s)	Publisher
Text Fault Tolerant Computer system design, Software Fault Tolerance Techniques and Implementation, Hardware and Software Architectures for Fault Tolerance: Experiences and Perspectives,	D.K. Pradhan, Laura L.Pullum,	Prentice Hall Artech
Reference Coding Approaches to Fault Springer Tolerance in combinational and Dynamic Systems,	Michel Banatre, C N Hadjicostis	Springer

CS-7203A**DIGITAL IMAGE PROCESSING****L T P**
3 1 0**Credits-4****Unit-I**

Image model, human vision, digital images representation, image acquisition, storage, processing, communication and display, Image Geometry, Image transformations, Discrete Fourier transformation, Fast Fourier Transformation, other represent able image transformation.

(12 Hrs)

Unit-II

Image enhancement, special domain and frequency domain methods, enhancement by point frequency, special filtering, enhancement in frequency domain, color image frequency.

(12 Hrs)

Unit-III

Image restoration, degradation model, algebraic approval to restoration, constrained least square restoration, Interactive restoration, restoration in special domain.

(12 Hrs)

Unit-IV

Image compression, image compression models, loss less and glossy image compressions methods. Image segmentation, detection of discontinuities, edge detection and boundary detection, shareholding, Region oriented segmentation.

(12 Hrs)

Recommended Books:

Title	Author(s)	Publisher
Text Digital image processing, Digital Image Processing, Introductory Computer	Rafacl C. Gonzalez, Jain Tenber,	Addison Wesley PHI
Reference Vision and Image Processing, Digital Processing,	Adrian Low, Rasenfeld P Kak,	MCGraw Hill Academic Press

CS-7203B

SOFTWARE RELIABILITY & TESTING

L T P
3 1 0

Credits-4

Unit-I

Introduction: Software Reliability & Hardware Reliability, Basic Concepts, Availability, Modeling.

Selected Models: Execution Time Component, Calendar Time Component, Model Choice.

(12 Hrs)

Unit-II

Applications: System Engineering, Project Management, Management of Operational Phase, Evaluation of S/W Engg Technologies.

(12 Hrs)

Unit-III

System Definition: Failure definition, System Configuration, Text Run Selection.

Parameter Determination: Execution Time Component, Calendar Time Component.

(12 Hrs)

Unit-IV

Project Specific Techniques: Unobserved Failures, Failure Time Measurement, Evolving Programs, Changes in Environment, Other Consideration.

(12 Hrs)

Recommended Books:

Title	Author(s)	Publisher
Software Engineering concepts	Pressman	TMH

CS-7203C

NETWORK PROGRAMMING

L T P
3 1 0

Credits-4

UNIT-I

Introduction: OSI model, processes, client server model, signals, process control, daemon processes Interprocess Communication, File and record locking, pipes, streames and messages, name spaces, message queues, semaphores, shared memory.

(12 Hrs)

UNIT-II

Communication Protocols: Formats of the TCP/IP,XNS, SNA ,NetBIOS, OSI Protocols and UUCP, Protocols comparison.

(12 Hrs)

UNIT-III

Berkley Sockets: Unix Domain Protocols, socket addresses, reserved ports, stream pipes, Asynchronous I.O, Input /Output Multiplexing, socket system calls, socket implementation.

Transport Layer Interfaces: Transport End point addresses, streams, and TLI implementation.

(12 Hrs)

UNIT-IV

Trivial File Transfer Protocol: Data formats, connection, client user interface, UDP implementation, TCP implementation.

Remote Login: Terminal Line disciplines, Pseudo Terminals, Terminal modes, Windowing environment, rlogin client/server

Remote Procedure Calls: Transparency issues, Sun RPC, Xerox Courier.

(12 Hrs)

Recommended Books:

Title Text	Author(s)	Publisher
Unix Network Programming	Richard Stevens	PHI

UNIT I

The Mobile Radio Environment: Representation of a mobile radio signal, Causes of propagation path loss and fading, Classification of channels, Definitions of necessary terms (averages, pdf, CPD etc.), Delay spread and coherence bandwidth, Diversity schemes, Combining techniques.

(11 Hrs)

UNIT II

Mobile Radio Interference: Co-channel and adjacent-channel interference, Near-and-to-far end ratio, Inter symbol and Simulcast interference.

Frequency Plans & Cellular Concept: Channelized schemes and frequency reuse, FDM, TDM, Spread Spectrum & Frequency hopping, Cellular concept, Frequency reuse and cell separation, HO, Spectral efficiency and cellular schemes, Separation between co-channel cells.

(13 Hrs)

UNIT III

Design Parameters: At the Base Station: Antenna locations, Antenna spacing and height, Noise environment. At the Mobile Unit: Antenna spacing and height, Mobile unit standing still and in motion.

Signaling & Channel Access: False alarm & Word-error rates (Gaussian environment), Channel assignment, Frequency assignment, Under Lay and Overlay Configurations.

(13 Hrs)

UNIT IV

Cellular CDMA: Narrowband & Wideband wave propagations, Key elements in designing cellular, Spread Spectrum techniques in modulation, Capacities of multiple-access schemes, DS-CDMA, FH-DCMA, TH-CDMA.

Microcell: Design of a conventional cellular system, Description of new micro cell system design.

(11 Hrs)

Recommended Books:

Title	Author(s)	Publisher
Text Mobile Communications Design Fundamentals	W.C.Y. Lee	John Wiley & Sons.
Mobile Cellular	W.C.Y. Lee	Telecommunication Systems.
Reference Wireless and Cellular Communications	William C. Y. Lee	McGraw-Hill

UNIT-I

System Models: Introduction to systems; scientific and nonscientific systems; discrete & continuous systems; characteristics of systems; different views of systems; modeling of systems; physical and symbolic models; examples of models from various disciplines, Computer systems; electrical systems, economic system & inventory system.

(12 Hrs)

UNIT-II

System Simulation: Continuous system simulation; analog versus digital simulation; basic operation & notation for analog simulation; linear systems & simultaneous equation representation; digital computer simulation; simulation of a real life time-dependent system via a programming language such as Fortran/Pascal.

(12 Hrs)

UNIT-III

Discrete system simulation-event, activity & process; representation of time; fixed stem vs. event-to-event model; analysis of a discrete system; generation of random number generation for microcomputers; testing of pseudo-random numbers; monte-carlo computation; simulation of a real life discrete system.

(12 Hrs)

UNIT-IV

Computer language for simulation of continuous & discrete systems; characteristics of a simulation language; introductory discussion of CSMP, GPSS and SIMSCRIPT.

(12 Hrs)

Recommended Books:

Title	Author(s)	Publisher
Text		
Simulation and Modeling	Liffick	TMH
System Simulation with Digital Computer	Deo	PHI
Reference		
Computer Simulation and Modeling	Neelamkavil, John-Wiley	
System Simulation	Gorden	PHI

UNIT I

Linear Programming: Basic concepts and notations. Mathematical formulation of linear programming problem(L.P.P.), Graphical solution, Fundamental theorem, Standard format, Simplex method, Two phase method, Big M method, Degeneracy, Primal and Dual, Solution of primal and Dual and vice versa, Complementary slackness condition.

(13 Hrs)

UNIT II

Transportation and Assignment Problem: Basic concepts and notations. Balanced and unbalanced transportation problems. Initial BFS of TP using North West corner rule, Matrix Minima method and Vogel's approximation method, Improving an initial BFS to optimum BFS, Transshipment problem, Definition of assignment problem, Hungarian method to solve assignment problem.

(11 Hrs)

UNIT III

Network Analysis and Models: Notations and definitions, Arrow diagram, CPM (Critical Path Method) and PERT (program evaluation and Review Technique), Crashing, Maximum Flow Problem (MFP) and Shortest Path Problem (SPP).

Game Theory: Introduction, Maximum and Minimum criterion, Saddle point, Games without a saddle point, 2*2 games with and without saddle point (Mixed strategies), Two persons zero sum 2*n or n*2 games, Dominance rule, Graphical method solution.

(13 Hrs)

UNIT IV

Queuing Theory: Notation and basic concepts, Analysis of M/M/1/FCFS and M/M/1/C/FCFS with poisson pattern of arrivals and exponentially distributed service time).

(11 Hrs)

Recommended Books:

Title	Author(s)	Publisher
Text		
Operation Research	A.H. Taha	PHI Pvt. Ltd.
Operation Research	S.D. Sharma, Kedar Nath Om Prakash	
Reference		
Operation Research	D.S. Hira, P.K. Gupta,	S. Chand & Co.

UNIT-I

Introduction to Distributed Systems: Advantages of distributed systems over centralized systems, hardware concepts, bus based and switched multi-processors, based and switched multi-computers, software concepts- network operating system, true distributed systems, design issues: transparency, flexibility, reliability, performance and scalability.

(13 Hrs)

UNIT-II

Communication in distributed systems: Layered protocols, asynchronous transfer mode, networks, client server models, remote procedure calls, introduction to group communication, Synchronization in distributed systems, Clock synchronization, mutual exclusion algorithms, election algorithms, atomic transactions, deadlocks in distributed systems.

(13 Hrs)

UNIT-III

Processes and processors in distributed systems: Threads, system models, processor allocation models, scheduling in distributed systems, fault tolerance, real time distributed systems.

(11 Hrs)

UNIT-IV

Distributed file systems: Design, implementation, trends in distributed file systems, Distributed shared memory concepts, consistency models, page based shared variables and object based distributed shared memory.

(11 Hrs)

Recommended Books:

Title	Author(s)	Publisher
Text Distributed Operating Systems	Andrew S. Tanenbaum	Pearson Education
Distributed operating Systems	Pradeep K. Sinha	PHI
Reference Distributed Operating Systems and Algorithm Analysis	R. Chow, T. Johnson	Pearsaon

Unit-I

Fuzzy Set Theory: Introduction to Fuzzy Sets, Operation on Fuzzy Arithmetic and Fuzzy Relations.

Fuzzy Rules and Fuzzy Reasoning: Multi-valued logics, Fuzzy propositions, Fuzzy Quantifiers, Linguistic Hedges, Fuzzy Inference and Reasoning, Rules Composition and Defuzzification, Examples of use of Fuzzy logic in control of real world systems.

(12 Hrs)

Unit-II

Genetic Algorithms: Biological background of Genetic Algorithms; Simple Genetic Algorithm, Chromosome representations; crossover operations; Mutation operations, Operational Rates; concept of exploration and exploitation , Selection Schemes; Fitness function design; Population size; Replacement Schemes; Parameter tuning and control, Convergence of algorithm, Application of Genetic Algorithms.

(12 Hrs)

Unit-III

Artificial Neural Networks: Introduction to Biological Neuron, Architecture, Learning: Supervised and Unsupervised, Back-propagation and Feed-forward Networks, Perceptron, Adaline, Back-propagation Multilayer Perceptrons, Back-propagation Learning Rule, Methods of Speeding, Radial Basis Function Networks, Support Vector Machine. Competitive Learning Networks, Kohonen self-organizing networks, The Hopfield Network.

(12 Hrs)

Unit-IV

Neuro- Fuzzy Modeling: Neural Networks and Fuzzy Logic, Fuzzy Neuron, Fuzzy Perceptron, Fuzzy classification Networks using Backpropagation, Fuzzy Neural Inference System, Fuzzy Adaptive Resonance Theory, Fuzzy Associative Memory, Neural-Fuzzy Systems, Neuro Fuzzy Evolutionary Integration.

(12 Hrs)

Recommended Books:

Title	Author(s)	Publisher
Text Neural Networks, Fuzzy Sets and Fuzzy Logic: Theory and Applications,	Satish Kumar,	TMH
Reference Genetic Algorithms: Concepts and Designs,	George J, Bo Yuan, Man and Kwong ,	PHI Springer Verlag

EC-7104A OPERATION RESEARCH

L T P
3 1 0

Credits:4

Unit I

Scope of Operations Research: Introduction to linear and non-linear programming Formulation of different models.

Linear Programming: Geometry of linear programming, Graphical method, Linear program in standard form, Solution of LP by Simplex and Revised Simplex methods, Exceptional cases in LP, Duality theory, Dual Simple method, and Sensitivity analysis.

(12 Hrs)

Unit II

Network Analysis: Transportation problem (with transshipment), Assignment problem, Traveling-salesman problem, Shortest route problem, Minimal spanning tree, Maximum flow problem. Branch and bound algorithm, Traveling salesman problem.

Dynamic programming: Forward recursions, General problem, Reliability problem, Capital budgeting problem, and Cargo-loading problem.

(12 Hrs)

Unit III

CPM and PERT: Drawing of networks, Removal of redundancy, Computing Earliest occurrence time, Latest occurrence time, Free slack, Total slack, Crashing, Resource allocation. Non-Linear Programming: Characteristics, Concepts of convexity, maxima and minima of functions of n-variables using Lagrange multipliers and Kuhn-Tucker conditions, One dimensional search methods, Fibonacci and golden section method, Optimization using gradient methods for unconstrained problems.

(12 Hrs)

Unit IV

Nature and objectives of research: Methods of Research, historical, descriptive and experimental Alternative approaches to the study of the research problem and problem formulation. Formulation of hypotheses, Feasibility, preparation and presentation of research proposal.

Sampling: Primary and secondary data, their collection and validation, methods of sampling: Simple random sampling, stratified random sampling and systematic sampling.

(12 Hrs)

RECOMMENDED BOOKS

Text Books

Title

Research Methodology
Research Methodology

Author

C.R. Kothari
P.G. Tripathi

Publisher

Wishwa Prakashan
S. Chand & Sons

Reference Books

Title

Statistical Analysis for Engineers
& Scientists
Measurement & Prediction
Business Research Methods

Author

J.W. Barnes
Stoufferetal
Donald Cooper

Publisher

McGraw Hill, N. York
Wiley, N. York
TMH

EC-7104B MOBILE COMMUNICATIONS

L T P
3 1 0

Credits:4

Unit I

Introduction: History of wireless communication, Need of mobility, Application of wireless communication, Cellular concept.

First Generation (1G) Mobile Systems: Advanced Mobile Phone System (AMPS) and Nordic Mobile Telephony (NMT), frequency allocation, channels, modulation, multiple access scheme, network operation.

(12 Hrs)

Unit II

Second Generation (2G) Mobile Systems: Network architecture, channels and operation of GSM, CDMAOne (IS-95), and IS-41, mobility management, Network operations of GPRS, CDMATwo (IS-95B), CDPD, and HCS.

(12 Hrs)

Unit III

Third Generation (3G) Mobile Systems: 3G spectrum requirements, enabling technologies, service classes, applications and radio access standards (WCDMA and CDMA2000), Introduction to EDGE and WLAN. Introduction to 4G.

(12 Hrs)

Unit IV

Network Layer Mobility: Mobile IP, Goals, Assumptions and requirements, Entities and terminology, IP packet delivery, Agent advertisement and discovery, Registration, Tunnelling and Encapsulation, Optimisation, Reserve Tunnelling, ipv6 Protocol, Dynamic Host configuration Protocol(DHCP), Micro-mobility.

(12 Hrs)

RECOMMENDED BOOKS:

Text Books

Title	Author	Publisher
Mobile Communications	J.Schiller	Pearson Education

Reference Books

Title	Author	Publisher
Obaidat	Nicopolitidis	Papadimitriou
Wireless Networks	Pomportsis	John Wiley and Sons

EC- 7104C ELECTRONIC INSTRUMENTATION

L T P

Credits:4

3 1 0

Unit I

Introduction: Basic Concepts of Measurement, measurement system, basic characteristics of measuring devices.

Transducers: Measurement of displacement, strains, vibration, pressure, flow, level, temperature, light, PH, humidity, performances, characteristics, characteristics and selection for a given application.

(12 Hrs)

Unit II

Electronic Measuring Instruments: Advanced Sernescope and displays, high speed oscilloscope, sampling oscilloscope, DSO wave analyzer, distortion analyzer, modulation analyzer, spectrum analyzer, wave meters, digital phase meters, frequency synthesizer, logic state analyzer, LCR meters.

(12 Hrs)

Unit III

Data Acquisition and Transmission: Objectives of DAS, signal conditioning of inputs, single channel DAS, multi-channel DAS, computer based DAS, data loggers, sensors based computer data system, electromechanical ADC, digital transducer, data transmission system, comparison of analog and digital data transmission, modems.

(12 Hrs)

Unit IV

Recorders and Display Devices: Strip chart recorder, Galvanometer type recorder, null type recorder, circular chart recorder, X-Y recorder, magnetic recorders, FM recording, digital data recording, potetiometric recorder, digital memory waveform recorder, digital display system and indicators, classification of displays, LED, seven segment display, LCD, Nixie tube.

(12 Hrs)

RECOMMENDED BOOKS:

Text Books

Title

Electrical and Electronics Measurements and Instrumentation

Author

AK Sawhney

Publisher

Dhanpat Rai and Co,
New Delhi

Reference Books

Title

Electronics Measurement and Instrumentation

Author

HW Cooper

Publisher

Prentice Hall India Ltd

Principles of Measurement System

J P Bartley

Longman London

EC-7104D SOFTWARE TOOLS FOR ELECTRONIC DESIGN

L T P
3 1 0

Credits:4

Unit I

Introduction: What is VHDL, History, Capabilities, Hardware abstraction, Basic terminology, Entity declaration, Architecture body, Configuration declaration, Package declaration, package body.

(12 Hrs)

Unit II

Behavioral Modeling: Entity declaration, Architecture body, Process assignment statement, Signal assignment statement, Wait statement, If statement, Case statement, Null statement, Loop statement, Exit statement, Next statement, Assertion statement, other sequential statements, Multiple processes, Postponed Processes.

(12 Hrs)

Unit III

Dataflow Modeling And Structural Modeling: Concurrent signal assignment statements, Concurrent versus sequential signal assignments, Delta delay revisited, Multiple drivers, conditional and Selected signal assignment statements, Block statement, Concurrent assertion statement, component declaration, Component instantiation, Resolving signal values.

(12 Hrs)

Unit IV

Graphical Programming in Lab VIEW: Lab VIEW basics, Lab VIEW environment, panel and diagram windows, virtual instruments, front panel, block diagram, building virtual instrument, data flow programming, building VI using express VIs, simple worked examples using Lab VIEW.

(12 Hrs)

RECOMMENDED BOOKS:

Text Books

Title

VHDL Primer

Learning with Lab VIEW 7 Express by

Author

J. Bhasker

Robert H. Bishop

Publisher

Pearson Education

Pearson Education

Reference Books

Title

VHDL Programming by Example

Author

Douglas L. Perry

Publisher

Tata Mcgraw Hill

Introductory VHDL from Simulation to Synthesis

Sudhakar Yatamanchili

Pearson Education

EC-7105A TELEVISION ENGINEERING

L T P
3 1 0

Credits:4

Unit I

Fundamentals Of Television: Characteristics of eye and television pictures – Resolution and brightness gradation. Theory of Scanning. Camera tubes – Vidicon and Silicon diode array vidicon, Monochrome picture tube, Composite.

(12 Hrs)

Unit II

Monochrome Television Receiver: Transmission and Propagation of TV signal, TV antenna, Receiver: VHF Tuners, Vision IF subsystem, Inter carrier sound system, Video amplifiers, Synchronous separation AFC and deflection Oscillators frame and line deflection circuits.

(12 Hrs)

Unit III

Color Television Systems: Color Characteristics– Color cameras Color picture tubes, Color signal generation and encoding, NTSC, PAL and SECAM Systems.

Color Television Receivers: Block diagram of PAL-D receivers, Luminance channel, Chrominance amplifier, Color burst separation and burst phase discriminator, Sub carrier Oscillator AGC circuits, Ident and color killer circuits, U and V demodulators, R, G, B matrix and drivers.

(12 Hrs)

Unit IV

Special Topics In Television: The dimensions of video signals, dimensions of the Nyquist volume, significant frequencies in the Nyquist volume, signal distinctions in the Nyquist volume, distinctions by energy levels, distinctions by modulation method, distinctions by filtering, cooperative three dimensional filtering.

(12 Hrs)

RECOMMENDED BOOKS:

Text Books

Title	Author	Publisher
Modern Television Practice	Gulati.R.R	New Age Int.

Reference Books

Title	Author	Publisher
Television and Video Engineering	Dhake.A.M	McGraw
Basic television and video systems	Grob.B	McGraw

EC-7105B RELIABILITY ENGINEERING

L T P
3 1 0

Credits:4

Unit I

Introduction: Reliability concepts and patterns of failure, Reliability management, Reliability for system effectiveness.

(12 Hrs)

Unit II

Reliability And Hazard Rates: Failure data, reliability function, failure rate and hazard rate, common distribution in failure mechanism, exponential weibusi-gamma, log normal extreme value, model selection for component failures, failure analysis.

(12 Hrs)

Unit III

Reliability Prediction And Analysis: Reliability prediction based on exponential distribution, system reliability analysis-block diagram method, fault tree and secon tree method, luen tree method, and failure mode and failure mechanisms.

(12 Hrs)

Unit IV

Reliability Design: Design for reliability, design process, assessment methodology, reliability allocation, reliability improvement, selection of components to improve system reliability.

(12 Hrs)

RECOMMENDED BOOKS

Text Books

Title

Reliability Engg & Technology

Author

A.K Gupta

Publisher

Macmillan India ltd Delhi

Reference Books

Title

Introduction to Reliability
engineering

Author

E S Lewis

Publisher

John Wiley & sons New York

EC-7105C EMBEDDED SYSTEMS

L T P
3 1 0

Credits:4

Unit I

Introduction: An Introduction to Embedded Systems, Real-Time Systems, Hard Real-Time, Soft Real-Time. Real-Time Embedded Systems, Embedded Processors, The Advent of PC Embedded Systems, PC Hardware Components, Embedded system Design, Tools and components.

(12 Hrs)

Unit II

8051 Microcontroller: Embedded System Hardware Approach, Overview of 8051 family, ADC /DAC Interface issues, Timer/Counter Programming in the 8051, 8051 Serial Communication, Interrupts Programming, Real World Interfacing, Sensors, Stepper Motor, Keyboard, DAC, 8051/31 Interfacing to External Memory.

(12 Hrs)

Unit III

80196 Microcontroller: Intel 80196 micro controller – CPU operation – Memory space – software overview – Peripheral overview – Interrupts -Programming concepts (Not in detail). Peripheral Interface Controller (PIC)-General architecture-PIC16F84-Architecture-Addressing modes-Instruction set-Simple Programming (Not in detail)

(12 Hrs)

Unit IV

Real Time Operating Systems: Embedded System Software: Round Robin with Interrupts, Function-Queue-Scheduling Architecture, Introduction to Real-Time Operating Systems, Real-Time Operating System Architecture, Selecting Architecture, Tasks and Task States, Tasks and Data, Real Time and Embedded Linux: Features.

(12 Hrs)

RECOMMENDED BOOKS:

Text Books

Title	Author	Publisher
The 8051 Micro controller and Embedded Systems	M. A. Mazidi and J. G. Mazidi	
Real-Time Programming: A Guide to 32-bit Embedded Development	R. Grehan, R. Moote, and I. Cyliax	Pearson Education

Reference Books

Title	Author	Publisher
An Embedded Software Primer	D. E. Simon	Pearson Education
Embedded Linux: Hardware, Software, and Interfacing	C. Hollabaugh	Pearson Education

EC-7105D COMPUTER ARCHITECTURE DESIGN

L T P
3 1 0

Credits:4

Unit I

Introduction: Evolution of computer, hardware, software and firmware, Computer architecture, Types of computer, future trends, Different types of buses

(12 Hrs)

Unit II

Computer Instruction Set: Introduction, opcode encoding, Addressing modes, Instruction types, data transfer, arithmetic, logical, program and system control, Reduced Instruction set computers, Introduction to parallel processing.

(12 Hrs)

Unit III

Execution Unit: Introduction, general register and combinational shifter design, flag register, Adders, ALU design, bit slice processor, Coprocessors.

Control Unit: Introduction, basic concepts, Design methods: hardware control design and micro programmed control unit

(12 Hrs)

Unit IV

Memory Organization: Introduction, characteristics of memory systems, main memory design, popular electromechanical memory devices, memory hierarchy, cache memory. Associative memory, virtual memory and memory management concepts

Input/Output: Basic concepts programmed I/O, standard vs memory mapped /o, Interrupt I/O, Direct Memory address.

(12 Hrs)

RECOMMENDED BOOKS:

Text Books

Title

Modern Computer
Architecture

Author

RAFIQUZZAMAN and CHANDRA,

Publisher

Galgotia

Reference Books

Title

Computer Architecture

Author

HAYES

Publisher

McGraw Hill

EC-7105E STATISTICAL AND COMMUNICATION THEORY

L T P
3 1 0

Credits:4

Unit I

Review of Signals and Systems: System theory, Stochastic process, Representation of Stochastic Process, Likelihood and Sufficiency.

(12 Hrs)

Unit II

Random processes: Review of Probability Theory, Random variable, Two random variables, Random Process classification, Stationary and non-stationary process, correlation functions, Stochastic Integrals, Fourier transform of random process, Ergodicity and power spectral density, transformation of random process by linear systems, Representation of random processes, White Gaussian Noise, Shot noise processes, Markov processes.

(12 Hrs)

Unit III

Detection Theory: CFAR Detection, Sequential detection, Walds test, Detection of known signals in white noise, the correlation receiver, Detection of known signals in coloured noise, Maximum SNR Criteria.

(12 Hrs)

Unit IV

Estimation Theory: Bayes estimation, Real parameter estimation, Maximum likelihood estimation, Cramer Rao inequality, lower bound on the minimum mean square error in estimating a random parameter, General gaussian problem.

Estimation of Waveforms: Linear MMSE of waveforms, Estimation of stationary process, The Wiener Filter, Estimation of non-stationary process, The Kalman filter.

(12 Hrs)

RECOMMENDED BOOKS:

Text Books

Title

Statistical Theory of Communication, 2nd edition
Statistical Communication Theory

Author

Yuk Wing Lee
B.P. Lathi

Publisher

Reference Books

Title

Probability random variables and stochastic processes, 4th edition
Digital communication" 2nd edition

Author

Athanasios
Papoulis
Bernard Sklar

Publisher

EC-7105F DIGITAL LOGIC CONTROLS

L T P
3 1 0

Credits:4

Unit I

Transform Analysis of Sample Data System: Introduction to sampling data control system, Linear difference equations, input model of discrete time system, pulse response, Z-transform, linear discrete systems (LDS), inverse Z-transform and response of linear discrete systems, Z and S domain relationship, stability analysis.

(12 Hrs)

Unit II

Digital Control System: Introduction, sampled signal representation, hold device, pulse transfer function, block diagrams, transient response, design of digital controller, process delays, digital controller for dead beat response, discrete time state equations, similarity transformations, system representation in Jordan Canonical form, Cayley-Hamilton theorem, state equations for sampled data system.

(12 Hrs)

Unit III

Sequence Control: Input and output devices, logic functions and diagrams, fluidic devices including logic elements, operations using fluidic elements, , ladder diagrams, Relay ladder diagrams, timers, hydraulic and pneumatic actuating systems, programmable logic controllers.

(12 Hrs)

Unit IV

Programmable Logic Control: Characteristics function of PLC, block diagram of PLC and applications, PLC hardware, input/output modules, processor, power supply, programmable devices, memory organization, programming basics, ladder logic diagram, ladder programming basic instructions, simple programming example of a manufacturing unit., introduction to distributed control system and their application in process control automation.

(12 Hrs)

RECOMMENDED BOOKS

Text Books

Title	Author	Publisher
Digital Control System	C.H. Hosteller	McGraw Hill
Digital Control System	Nagrath Gopal	Wiley Eastern

Reference Books

Title	Author	Publisher
Digital Control System	Chan. Mourad	Prentice Hall
Digital communication" 2 nd edition	Bernard Sklar	

EC-7105G NEURAL NETWORKS, FUZZY LOGICS AND GENETIC ALGORITHMS

L T P
3 1 0

Credits:4

Unit I

Neural Networks characteristics: History of development in neural Networks Principles, Artificial Neural Net terminology, Model of a neuron, topology, learning types of learning supervised unsupervised, re-inforcement learning.

Basic Hopfield Model: the perceptron, linear separability, Basic learning laws: Hebb's rule, Delta rule, Widrow & Hoff LMS learning rule, correlation learning rule, instar and outstar learning rules.

(12 Hrs)

Unit II

Unsupervised learning: competitive learning, K-means clustering algorithm, Kohonen's feature maps.

Radial Basis: Function neural networks, basic learning Laws in RBF nets, Recurrent networks, recurrent back propagation, and Real Time Recurrent learning algorithm. Introduction to counter Propagation networks, CMAC networks, ART networks.

Applications of neural nets such as pattern recognition: optimization, associative memories, vector quantization, control, Applications in speech and decision-making.

(12 Hrs)

Unit III

Fuzzy Logic: Basic concepts of Fuzzy Logic, Fuzzy vs Crisp set, Linguistic variables, membership functions, operations of fuzzy sets, fuzzy IF-THEN rules, variable inference, techniques, defuzzication techniques, basic fuzzy inference algorithm, Applications of fuzzy logic, Fuzzy system design, Implementation of fuzzy system, Useful tools supporting design.

(12 Hrs)

Unit IV

Introduction to Evolutionary Computation: Biological and artificial evolution, Evolutionary computation and AI, Different historical branches of EC, e.g., GAs, EP, ES, GP, etc., A simple evolutionary algorithm, genetic algorithmic methods and applications.

Text Books

Title	Author	Publisher
Neural Networks Reference Books	Simon Haykin -	Pearson Ed
Title	Author	Publisher
Fuzzy Systems Design Principles, Building Fuzzy IF-THEN Rule Bases	By Riza C. Berkin & Trubatch, Jeeebcss	Chand Publishers
“An Introduction to Genetic Algorithms for Scientists and Engineers”	David A Coley,	World Scientific Publishing Company, (1997).

(12 Hrs)

EC-7203A HDTV ENGINEERING

L T P
3 1 0

Credits:4

Unit I

High Definition Television-Its Status and Prospectus: Introduction, Aspect ratio, Viewing distance, HDTV channel requirements, Compatibility, Outlook for Direct Broadcast Satellite Service, Out looks for Videotape and discs.

Techniques of Advanced Television System: Improvement in horizontal resolution, Improvement in vertical resolution, Display dimensions, Luminance-chrominance filtering in transmission, Signal compression for satellite service- The MAC system, The MUSE system, Bandwidth requirements for HDTV distribution system, Bandwidth requirements for terrestrial HDTV service, Signal occupancy within conventional channels.

(12 Hrs)

Unit II

Visual Aspects of High Definition Images: Objectives of HDTV service, Foveal and peripheral vision, Vertical details and viewing distance, Horizontal detail and picture width, Total details content of the image, Perception of depth, Contrast and tonal range, Luminance and chrominance, Chromatic aspects of vision, temporal factors of illumination, Continuity of motion, Smear and related effect, Flicker, Defects of interlaced scanning.

Digital Operations In Video Systems: Post detector digital processing, Line, field and frame stores, Digital filters, Digital processing of television sound.

(12 Hrs)

Unit III

Space And Time Components Of Video Signals: The dimensions of video signals, dimensions of the Nyquist volume, significant frequencies in the Nyquist volume, signal distinctions in the Nyquist volume, distinctions by energy levels, distinctions by modulation method, distinctions by filtering, cooperative three dimensional filtering.

Compatibility In HDTV Systems: Definition of compatibility, compromises in compatibility system, classes of compatibility, the transcoding functions, single and wide channel compatibility, simulcasting.

(12 Hrs)

Unit-IV

The 1125 Line HDTV System: Status of the 1125 line system, Basis of NHK 1125 line system, Equipment development, Transmission and modulation methods, Noise in 1125 line MUSE service, signal compression in MUSE system.

Picture Displays: Classification, Format development, cathodes ray tube displays, Flat panel displays, CCD displays.

(12 Hrs)

RECOMMENDED BOOKS

Text Books

Title
HDTV

Author
K. Blair Benson &
Donald G. Fink

Publisher
McGraw Hill

Reference Books

Radio and TV Engg
Electronic Communication systems
Monochrome and Colour TV

G. K. Mittal
Kennedy
R. R. Gulati

Khanna Publisher
MacGraw Hill
Dhanpat Rai &
Sons

EC 7203B INDUSTRIAL AUTOMATION

L T P
3 1 0

Credits:4

Unit I

Mechatronics, Sensors and Transducers: Introduction to mechatronics systems, utility of automation, automation process, simple example, sensors for displacement, position, proximity, velocity, motion, force, fluid pressure, liquid flow, liquid level, temperature, light, selection criterion, digital transducers including encoders, optical encoders, rotational speed sensors and tacho-generators, robotics and tactile sensors, smart sensors.

(12 Hrs)

Unit II

Control Actions and Components: On-off, proportional, PI, PD, PID actions, pressure transmitters, temperature transmitters, flow transmitters, limit, proximity, magnetic switches and relays.

(12 Hrs)

Unit III

Telemetry: Land-line telemetering system including voltage, current and position telemetering systems, radio frequency telemetry, pulse amplitude modulation telemetry, pulse-code modulation telemetry, radio link, complete telemetry package including transmitting and receiving systems, transmission channels and media, industrial remote control system with remote terminal units details, control center details, communication between control centers, control center and remote terminal units.

(12 Hrs)

Unit IV

Computer Based Instrumentation System: Measurement concepts, computer based data-acquisition system, sensors, measurand and sensor types, equivalent circuits and loading, sensors with electrical current output, variable resistance sensors, errors in measurement systems, signal conditioning, single ended versus differential amplifiers, ground loops, noise, aliasing, quantization noise, introduction to virtual instrumentation.

(12 Hrs)

RECOMMENDED BOOKS

Text Books

Title	Author	Publisher
Mechatronics	V.S.Bagad	Technical Publications
Transducers and Instrumentation	M.G. Joshi	Luxmi Publications (P) Ltd.

Reference Books

Sensors and Transducers	D Patronabis	Wheeler Publishing
Telemetry Principle	D. Patronabis	TMH
A Course in Electrical and electronic Measurements and Instrumentation	A.K.Sawhney	Dhanpat Rai and Co.

EC 7203C MEDICAL ELECTRONICS

L T P
3 1 0

Credits:4

Unit I

Physiological Control Systems: Human physiological systems including cardiovascular system, respiratory system, nervous system, physiological control systems, linear model of respiratory and muscle mechanics, static analysis of cardiac output, glucose and ventilation regulation, time domain analysis of neuromuscular reflex motion.

(12 Hrs)

Unit II

Bioelectric Potential And Electromyographic Measurements: Biometrics, man-instrument system, bioelectric potential sources, resting potential, action potential, electrode theory, bio-potential electrodes, biochemical transducers, electro-myogram, electro-cardiogram, and electro-encephalogram, electromyography, electro-myograph electrodes and electromyograph.

(12 Hrs)

Unit III

Respiratory And Cardiovascular Measurements: Electrocardiography, blood pressure measurement, blood flow measurement, plethysmography, heart sounds measurement, pacemakers, defibrillators, instrumentation for breathing mechanics, respiratory therapy equipment.

(12 Hrs)

Unit IV

Electroencephalographic And Sensory Measurements: Electro-encephalography, EEG electrodes, EEG electrode configuration, electroencephalograph, psycho-physiological measurements, instrumentation for testing motor responses and audiometer.

(12 Hrs)

RECOMMENDED BOOKS

Text Books

Title	Author	Publisher
Biomedical Instrumentation and Measurements	Cromwell, Weibell and Pfeiffer	(PHI)
A Handbook of Biomedical Instrumentation	R.S. Khandpur	Tata McGraw-Hill

Reference Books

Physiological Control Systems	Michael C.K.Khoo	(PHI)
.A Systems Approach to Biomedicine by	W. B. Blesser	(McGraw Hill)

EC-7203D MICROWAVE COMMUNICATION

L T P
3 1 0

Credits:4

Unit I

Introduction: Microwave frequency spectrum, familiarization with bands and wavelength.
(12 Hrs)

Unit II

Microwave Components: Wave guides, wave guide coupling, ferrite device faraday rotation, isolators, circulators, detector mounts, magic tee, frequency meter, cavity resonator, microwave filters, directional couplers, loop directional couplers two hole directional couplers, phase Shifters, attenuators, introduction to S parameters.
(12 Hrs)

Unit III

Microwave Tubes: Problem with conventional tubes, limped elements at microwave frequencies velocity modulations, multi cavity, klystron, mathematical analysis of two cavity klystrons, performance, reflex klystron, mathematical analysis, repeller voltage, accelerating Voltage mode, frequency tuning, Magnetrons, constructional features of cavity magnetron cylindrical magnetron oscillations strapping, pushing and pulling traveling wave tube, Performance and application.
(12 Hrs)

Unit IV

Semiconductor Microwave Devices: Transistors, integrated circuits, advantages of MIC's varactor diodes, step recovery diode, frequency multipliers, parametric amplifier, basic principles tunnel diode, principles, Gunn effect, Gunn diode application, avalanche effect impatt diode, trappat diode, characteristics and application of avalanche diode, principle of pin diodes & its application, schottky barrier diode, backward diode.
(12 Hrs)

RECOMMENDED BOOKS

Text Books

Title	Author	Publisher
Microwave	Gupta	Wiley

Reference Books

Microwave laboratory manual	Sisodia	Wiley
Microwave principles	Reich	EWP

EC –7203E SATELLITE COMMUNICATION

L T P
3 1 0

Credits:4

Unit I

Introduction: Origin of satellite communication, current state of satellite communication, orbital aspect of satellite communication and orbital effects in satellite communications, system performance.

Earth Station Technology: Earth station design including antenna, tracking small earth station antennas, equipments for earth stations video receive-only stations and frequency co-ordination.

(12 Hrs)

Unit II

Satellite Link Design: Basic transmission theory, system noise temperature and G/T rate, design of downlinks domestic satellite systems using small earth stations, up line design, design of satellite link for specified (C/N).

(12 Hrs)

Unit III

Modulation Techniques: Analog telephone and television transmission, energy dispersal, digital transmission, digital modulation and demodulation, digital transmission of voice, digital TV and bandwidth compression, TDM.

(12 Hrs)

Unit IV

Propagation On Satellite-Earth Paths And Its Influence On Link Design: Quantifying attenuation and depolarization, interference effects, rain and ice effects, monitoring propagation effects, advanced topics: - Forbid VSAT technology, mobile satellite N/W's, applications of satellite communication.

(12 Hrs)

RECOMMENDED BOOKS

Text Books

Title	Author	Publisher
Digital Satellite Communication	Tri T HA	Pratt Publishers

Reference Books

Satellite Communication	Timothy Pratt	Pratt Publishers
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EC-7203F WIRELESS NETWORKS

L T P
3 1 0

Credits:4

Unit I

Introduction: Differences between wireless and fixed telephone networks, Evolution of wireless networks, Examples of Wireless Communication Systems: Paging Systems, Cordless Telephone Systems, Cellular Telephone Systems, Comparison of common Wireless Communication systems, Traffic routing in wireless networks: circuit switching and packet switching.

(12 Hrs)

Unit II

Wireless Local Area Networks: Introduction, WLAN topologies, requirements, working and function of physical layer and MAC layer, IEEE standards for wireless networks, WiFi, Bluetooth, WiMax.

(12 Hrs)

Unit III

Wireless Internet: Mobile IP components, process of agent discovery, registration and de-registration, care-of-address, concept of tunneling, Limitations of Mobile IP, introduction to micro-mobility protocols.

(12 Hrs)

Unit IV

Ad Hoc Wireless Networks: Introduction, Challenges in ad hoc networks: spectrum allocation, media access, routing, multicasting, energy efficiency, security and privacy; problems in ad hoc channel access, receiver-initiated MAC protocols, sender-initiated MAC protocols and existing ad hoc MAC protocols; Ad hoc routing protocols: Destination sequenced distance vector (DSDV), Ad hoc on demand distance vector routing (AODV), Dynamic source routing (DSR), Temporally ordered routing algorithm (TORA).

(12 Hrs)

RECOMMENDED BOOKS:

Text Books

Title

Wireless communications:

Principles and practice

Wireless Networks

Author

Theodore S.

Rappaport

P. Nicopolitidis

Publisher

Third Indian reprint Pearson

Education Asia 2003.

M. S. Obaidat

Reference Books

Mobile and Personal

Communication systems and

services

Raj Pandya

Prentice Hall of India, 2001

Ad Hoc Mobile Wireless Networks

C. K. Toh

Pearson Education

EC-7203G ELECTRONIC SYSTEM DESIGN

L T P
3 1 0

Credits:4

Unit I

Design of Regulated Power Supplies: Design of regulated power supply, stabilization, reference element, Zener shunt regulator, emitter follower regulator, series-ass regulator, feedback regulator, series voltage regulators, IC voltage regulators and design of IC regulated power supply using three terminal regulators.

(12 Hrs)

Unit II

Design of Switch-mode and Uninterruptible Power Supplies: Comparison of switch-mode and linear power supplies, working principle of SMPS, fly-back converter, forward type converter, component selection for SMPS, control IC for SMPS, type of UPS, selection of UPS components and design of heat sink.

(12 Hrs)

Unit III

Design of Amplifiers and Oscillators: Selection of transistor type and important parameters, impedance levels, By-pass and coupling capacitor, selection, dynamic load line, operating point, transistor at high frequency, transistor parameters and design of composite feedback and power amplifiers, design considerations for oscillators.

(12 Hrs)

Unit IV

Design of Communication System: Design of diode modulator, transistor modulator, transistorized class-C modulators, detection, conversion and mixing, Super-Heterodyne radio receiver, AVC design considerations and radio transmitter design considerations.

(12 Hrs)

RECOMMENDED BOOKS:

Text Books

Title	Author	Publisher
A Monograph of Electronic Design Principle	NC Goyal and RK Khetan	Khanna Publishers

Reference Books

Electronic Fundamentals and Applications	J.D. Ryder	PHI, New Delhi
Electronics and Radio Engineering	FE Terman	McGraw Hill

EC- 7204A OPTICAL NETWORKS

L T P
3 1 0

Credits:4

Unit I

Introduction: Historical perspective, Fibre Characteristics, Group Velocity Dispersion, Different propagation Regimes, Dispersion Induced pulse broadening, higher order Dispersion, Dispersion Slope, Growth of optical communication systems to its current scenario.

(12 Hrs)

Unit II

Fiber nonlinearities: Fiber nonlinearities: SPM and XPM Induced Nonlinear effects, Nonlinear Birefringence Effects, XPM induced Modulation Stability, spectral & temporal Effects, XPM induced Non reciprocity, Implications for Optical Communication Systems.

(12 Hrs)

Unit III

Parametric Process: Four Wave Mixing, Second harmonic Generation Parametric Gain, Phase Matching Techniques, parametric Amplifications & its applications, Dispersion Management.

(12 Hrs)

Unit IV

Optical Networks: Introduction to optical networks, LAN, WAN and MAN, Various Optical topologies, Wavelength Routers, wavelength Converters, Survivability and multicast in optical networks.

DWDM: Dense wavelength Division multiplexing, Optical switches, EDFA, PDFA, & NDFA Optical amplifiers & their characteristics, Simulation results of DWDM systems.

(12 Hrs)

RECOMMENDED BOOKS

Text Books

Title

Optical Networks

Author

Black

Publisher

Pearson Ed.

Reference Books

Title

Non linear Fiber Optics

Author

G.P. Aggarwal

Publisher

Academic Press INC

EC- 7204B COMPUTATIONAL METHODS FOR ELECTRONICS & COMMUNICATION ENGINEERING

L T P
3 1 0

Credits:4

Unit I

MATLAB Fundamentals: Basics of MATLAB, MATLAB windows, file types, general commands, working with arrays of numbers, creating and plotting simple plots, creating, saving and executing script and function files.

(12 Hrs)

Unit II

MATLAB Interactive Computation: Matrices and vectors, matrix and array operations, arithmetic operations, relational operators, logical operators, elementary math functions, matrix functions, character strings.

(12 Hrs)

Unit III

MATLAB Programming: Script files, function files, language specific features, advanced data objects.

(12 Hrs)

Unit IV

MATLAB Applications: MATLAB applications in Linear algebra, curve fitting and interpolation, data analysis and statistics, numerical integration ordinary differential equations, nonlinear algebraic.

(12 Hrs)

RECOMMENDED BOOKS

Text Books

Title

Getting Started with MATLAB 5 by

Author

Rudra Pratap

Publisher

Oxford University

Reference Books

Title

Applied Numerical Methods with
MATLAB for Engineers and Scientists

Author

Steven C Chapra

Publisher

TMH

EC-7204C DIGITAL IMAGE PROCESSING

L T P
3 1 0

Credits:4

Unit I

Introduction to Electronic Image Processing: historical background, visual perception, Image formation, sampling & Quantization & application of image Processing.

Transforms used in Electronic Image Processing: Review of 1-D & 2-D Fourier Transforms, Discrete Fourier transforms & other image transforms.

(12 Hrs)

Unit II

Image Enhancement by Point operation: An overview of point Processing, constant & non-linear operations between image & histogram techniques.

Spatial Filtering & Fourier frequency Method: Noise in image, Spatial & Special Frequency filtering, image restoration.

(12 Hrs)

Unit III

Non-Linear image processing techniques: Non-linear Spatial/Mean/Adaptive & Homomorphic Filters.

Color Image Processing: Color Models, examples of color image processing, Pseudocoloring & color displays.

(12 Hrs)

Unit IV

Image segmentation & Representation: Image Thresh-holding, Edge/Line & Point direction, Region based segmentation & Image representation.

Introduction to Morphological filters & Image Compression

(12 Hrs)

RECOMMENDED BOOKS:

Text Books

Title	Author	Publisher
Digital Image Processing	Rafael C. Gonzale & Richard E. Woods	Pearson Education Asia (2nd edition 2002)
Fundamentals of digital image processing by	A.K. Jain	Prentice Hall Englewood Cliffs, N.J.

Reference Books

Title	Author	Publisher
Fundamentals of electronic image processing	Arthur R. Weeks, Jr	Eastern Economy Edition 2003, SPIE Press, Prentice hall of India New Delhi

EC- 7204D MICRO ELECTRO MECHANICAL SYSTEM

L T P
3 1 0

Credits:4

Unit I

Lithography: Introduction – Alternative – X-ray – Emerging lithography technologies – proximal probe – holographic – Stereo lithography / micro photo forming process.

Additive Techniques: Physical Vapor Deposition – Chemical Vapor Deposition – Electrochemical Deposition – Doping.

(12 Hrs)

Unit II

Dry Etching: Introduction – Physical Etching – Ion Beam Etching – Dry Chemical Etching – Plasma Jet – Dry Etching for Polymeric Materials – Application in IC Technology – Combination of Wet and Dry Etching.

Wet Bulk Micro Machining: Silicon Crystallography – Wet Isotropic and Anisotropy Etching – Etching Stop Techniques – Electrochemical Etching – Stop Techniques – Photo Etching – Assisted Electrochemical Etching Stop (for n – type silicon).

(12 Hrs)

Unit III

LIGA: LIGA processes – Application – micro-fluidic elements, micro-optical components, interlocking gear, and electro static actuators – technological barriers and competing technologies.

Surface Micromachining: Process – poly-silicon surface Micro aching modifications.

Micro Fabrication Applications: Sensors – actuators – gas sensors, solid-state gas sensors and micro machining – gas chromatography.

(12 Hrs)

Unit IV

MEMS Design: MEMS Design Considerations, Design for Fabrication - PolyMUMPS - Example of development of a pressure sensor through PolyMUMPS technique - MEMS Packaging.

MEMS Characterization Techniques: Scanning Probe Microscopy (SPM), Magnetic Force Microscopy (MFM), Atomic Force Microscopy (AFM), Scanning Tunneling Microscopy (STM), Scanning Electron Microscopy (SEM).

(12 Hrs)

RECOMMENDED BOOKS:

Text Books

Title	Author	Publisher
Fundamentals of Micro fabrication	Marc Modu,	CRC Press Boca Rato

Reference Books

Title	Author	Publisher
Nanotechnology Press, 1996.	Norio Taniguchi	Oxford University

EC-7204E NANO TECHNOLOGY

L T P
3 1 0

Credits:4

Unit I

Introduction: Introduction to nanoscale systems, Length energy and time scales, Top down approach to Nano lithography, Spatial resolution of optical, deep ultraviolet, X-ray, electron beam and ion beam lithography, Single electron transistors, coulomb blockade effects in ultra small metallic tunnel junctions.

(12 Hrs)

Unit II

Quantum Mechanics: Quantum confinement of electrons in semiconductor nano structures, Two dimensional confinement (Quantum wells), Band gap engineering, Epitaxy, Landaeur–Buttiker formalism for conduction in confined geometries, One dimensional confinement, Quantum point contacts, quantum dots and Bottom up approach, Introduction to quantum methods for information processing.

(12 Hrs)

Unit III

Molecular Techniques: Molecular Electronics, Chemical self assembly, carbon nano tubes, Self assembled mono layers, Electromechanical techniques, Applications in biological and chemical detection, Atomic scale characterization techniques, scanning tunneling microscopy, atomic force microscopy.

(12 Hrs)

Unit IV

Nano material and Applications: Nanoscale Manufacturing, Nanomanipulation, Nanolithography, Nanoscale Materials and Structures, Nanocomposites, Safety issues with nanoscale powders, Quantum wells, wires, dots and nanoparticles, Applications in energy, informatics, medicine, etc.

(12 Hrs)

RECOMMENDED BOOKS

Text Books

Title

Quantum Transport in Semiconductor Nanostructures in Solid state Physics”
Transport in Nano structures

Author

Beenaker and
Van Houten
David Ferry

Publisher

Ehernreich and Turnbell,
Academic press
Cambridge University
press 2000

Reference Books

Introduction to Mesoscopic Physics

Y. Imry

Oxford University press
1997

Electron Transport in Mesoscopic systems

S. Dutta

Cambridge University
press 1995

Single charge Tunneling”

H. Grabert and M.
Devoret

Plenum press 1992

EC 7204F VLSI DESIGN

L T P
3 1 0

Credits:4

Unit I

Review Of Mos Technology: Basic MOS transistor, enhancement and depletion mode transistors, nMOS and CMOS processes, thermal aspects of processing, production of masks.

Electrical Properties Of Mos Circuits: Parameters of MOS transistor, pass transistor, nMOS inverter, CMOS inverter, MOS transistor circuit model, latch up in CMOS circuits.
(12 Hrs)

Unit II

Design Processes: MOS layers, stick diagrams, design rules, double metal single polysilicon CMOS process.

Basic Circuit Concepts: Sheet resistance, area capacitance, delay unit, inverter delay, propagation delays (super buffer).
(12 Hrs)

Unit III

Cmos Logic Structures: CMOS complementary logic, BiCMOS logic, pseudo nMOS, dynamic CMOS, clocked CMOS, pass transistor logic, CMOS domino logic, NP domino logic, cascade voltage switch logic, source follower pull up logic.

Scaling Of Mos Circuits: Scaling factor, limitations, scaling of wires and interconnections.
(12 Hrs)

Unit IV

Subsystem Design And Layout: Architectural issues, gate logic, design of PLA, 4-bit arithmetic processor, 4-bit shift register, and lambda based design rule.

(12 Hrs)

RECOMMENDED BOOKS:

Text Books

Title	Author	Publisher
Basic VLSI design, systems and circuits	Pucknell DA and Eshraghian K.	PHI

Reference Books

Title	Author	Publisher
VLSI design techniques for analog and digital circuits	Geiger Rr, Allen PE, Strader NR	TMH

EC-7204G ATM NETWORKS AND B-ISDN

L T P
3 1 0

Credits:4

Unit I

Introduction: ATM, Communication networking technique, OSI, Data link layer, HDLC protocol, TDM, LLC layer, X.25, IP, Frame relay.

(12 Hrs)

Unit II

ATM Architecture: Structure of ATM cell header, ATM protocol stack, ATM interfaces, the physical layer, UTPOIA and WIRE, ATM adaptation layer, space division switch architecture, shared memory ATM switch architecture, shared medium ATM switch architecture, nonblocking switches with output buffer, multicasting, congestion control in ATM networks, deployment of ATM networks, Signaling.

(12 Hrs)

Unit III

Introduction to B-ISDN: Broadband networks: driving forces, LAN, WAN, possible application, function and physical topologies, random access for functional Bus-LAN, slotted aloha system, CSMA, CSMA with collision detection, throughput analysis of Token ring, short bus architecture, packet switching interconnection fabrics.

(12 Hrs)

Unit IV

Metropolitan Area Networks and B-ISDN: Distributed queue dual bus, DQDB segmentation, reassembly, protocol data unit, delay and blocking performance, delay and blocking performance of FDDI, Broadband ISDN and ATM, B-ISDN protocol reference model.

(12 Hrs)

RECOMMENDED BOOKS

Text Books

Title

Introduction to ATM networks

Author

Harry G. Perros

Publisher

Johan Wiley

Reference Books

An Introduction to Broadband Networks

Anthony S. Acampora

Springer

IE-7105A POWER PLANT INSTRUMENTATION

L T P
3 1 0

Credits:4

Unit I

Introduction: Various types of power plants, energy policy of India, priority for sources for power generation, selection of sites and unit size.

(04 Hrs)

Steam Power Plant: Operation of steam power plant, choice of steam pressure and temperatures, Rankine cycle and its analysis, Reheat and regenerative cycle, classification of steam turbines and their working, velocity diagrams, Governing of steam turbines, layout of steam power plant, Steam condensers, vacuum efficiency, and performance of cooling towers, Fuel handling, combustion equipment, Ash handling, Heat exchangers, reheaters, feed water reheaters and evaporators.

(08 Hrs)

Unit II

Nuclear Power Plant: Advantages and disadvantages, Generation of nuclear energy by fission, Nuclear reactor, nuclear reactions, types and applications, Layout of Nuclear plant.

(12 Hrs)

Unit III

Hydro Power Plant: Advantages and disadvantages, hydrological cycle, hydro-graph, flow duration curve, mass curve, selection of site, essential features of a hydro plant, selection of water turbines for a given hydro power plant, layout of a hydro power plant.

(12 Hrs)

Unit IV

Instrumentation: Instrumentation needed in steam power plants for plant supervision, safety and plant performance, Governing and controls needed for water flow, drum level, air/gas flow, coal flow, combustion control, control for furnaces, controls for turbine, condenser safety.

(12 Hrs)

RECOMMENDED BOOKS:

Title	Author	Publisher
Text Books		
Power Plant Engineering	Varma	Metroplitan Publication
Power Plant Control and Instrumentation	David M. Lindsley	IEE
Reference Books		
Nuclear Power	Loftness D Van Nostrand	McGraw Hill
A Text Book on Power System Engineering	M L Soni , P V Gupta & A Chakraborty	Dhanpat Rai and Co
Nuclear Power Plant System and Equipment	Lish	Industrial press

IE-7105B OPTO-ELECTRONIC INSTRUMENTS

L T P
3 1 0

Credits:4

Unit-I

Ray Tracing: Paraxial optics, matrix method in paraxial optics.

(06 Hrs)

Lasers: Principle of laser, He-Ne, CO₂ & ruby lesser constructions.

(06 Hrs)

Unit-II

Image Defects: Theories of image defects, aberrations, coma, distortions, astigmatism, chromatic aberrations their removal.

(12 Hrs)

Unit-III

Optical Devices: Principle & theory of telescopes reflecting & astronomical telescope & microscopes, principle & applications of ordinary camera.

(06 Hrs)

Holography: Principle of holography, theory & applications.

(06 Hrs)

Unit-IV

Design Criteria Of Opto-Electronic Systems: Prism & gratings, spectrophotometer, flame photometer, introduction to laser based instruments.

(12 Hrs)

RECOMMENDED BOOKS:

Title

Author

Publisher

Text Books

Optics

Ajoy Ghatak

TMH

Optics & Atomic Physics

D P Khandelwal

Himalaya Publishers

Reference Books

Optics

Jenkins & White

Mc Graw Hill

Laser Physics

Tarasov

Meer Publishers

IE-7105C MECHATRONICS

L T P
3 1 0

Credits:4

Unit-I

Introduction: Integrated Mixed Systems, Integration of Mechanical Engineering, Electronics & Control Engg and Computer Science.

(06 Hrs)

Dynamic Systems Modeling and Simulation: Equations of motion, transforming, physical model to Math, Model, linearization, Frequency response.

(06 Hrs)

Unit-II

Control Systems: Performance specifications, Transfer functions, Stability, Controller types and their design using frequency domain and Laplace domain method, PID control, Digital Control, z-transforms, problems in analogue to digital conversion-Nyquist frequency, Digital controller design.

(12 Hrs)

Unit-III

Sensors and Actuators: Temperature-Sensing Thermocouples, Stress, Strain and Force measurements using strain gauges, Piezoelectric strain sensors and Accelerometers, Analog / Digital Position Measurements, Velocity Measurements. Direct Current Motors, Stepper Motors, Piezoelectric Actuators.

(12 Hrs)

Unit-IV

Electronics: AD and DA converters, Op Amps, Microprocessors, Digital signal processing, Logic Circuit Devices, Gates- AND, OR, NAND etc. and combinations, Study of Some Mechatronics Devices: Hard disk drive, dot matrix printer, optical sensing and control mechanism in NC machine tools etc.

(12 Hrs)

RECOMMENDED BOOKS:

Title	Author	Publisher
Text Books		
Mechatronics	HMT	TMH
Introduction to Mechatronics and Measurement System	Michael B. Histan & David G. Alciatore.	McGrawHill
Reference Books		
Introduction to Robotics	John J Craig	AWL
Feedback Control System	Kuo	PHI

IE-7105D ELEMENTS OF COMMUNICATION ENGINEERING

L T P
3 1 0

Credits:4

Unit-I

Review Of Communication Engineering: Introduction, AM, FM, their side bands, comparison, sampling theorem, different pulse modulation techniques- PAM, PWM, PPM and PCM, FDM, TDM. Introduction to Fourier series and Fourier transform of periodic signals. Transfer functions and properties of practically realizable filters.

(12 Hrs)

Unit-II

Radio Transmitters: Block diagram explanation of low and high level AM transmitter, AM broadcast transmitter, DSB transmitter, SSB transmitter and Independent sideband transmitter, block diagram explanation of reactance tube and Armstrong FM transmitters, Stereophonic FM broadcast transmitter.

(12 Hrs)

Unit-III

Radio Receivers: AM diode detector, characteristics of radio receiver: sensitivity, selectivity, fidelity and image rejections, classification of radio receivers, TRF receiver and super heterodyne receiver, block diagram explanation of AM receiver, AM receiver using PLL, DSB and SSB receiver, Independent sideband receiver, AM broadcast receiver, noise in AM systems, FM detection, block diagram explanation of FM receiver and stereophonic FM broadcast receiver, noise in FM systems.

(12 Hrs)

Unit-IV

Television Engineering: Principle of camera, introduction of picture tube, scanning, frame, field, sync video signal, vestigial sideband transmission, block diagram of TV receiver and working, TV transmitter.

(12 Hrs)

RECOMMENDED BOOKS:

Title	Author	Publisher
Text Books		
Radio and TV Engg	G. K. Mittal	Khanna Publisher
Electronic Communication systems	Kennedy	MacGraw Hill
Reference Books		
Electronic Communications	Sanjeev Gupta	Khanna Publisher
Principles of Communications	Taub & Schilling	MacGraw Hill
Monochrome and Colour TV	R. R. Gulati	Dhanpat Rai & Sons

Unit-I

Vector Spaces: Vector spaces, subspaces, span, linear dependence & independence, dimensions, basis.

(06 Hrs)

Linear Transformation: Representation of linear transformation with respect to basis, Rank and nullity. Numerical linear algebra: - direct and iterative methods of solution of linear equations, matrices, norms, least square problems, Eigen value problems.

(06 Hrs)

Unit-II

Classical Optimization Techniques: Single variable optimization, multivariable optimization with no constraints, multivariable optimization with equity constraints, and multivariable optimization with inequity constraints, Linear programming, standard form of L.P.P., formulation of models, simplex methods, duality in L.P., transportation problems.

(12 Hrs)

Unit-III

Non-Linear Programming: One-dimensional search, Fibonacci and golden section method, unconstrained optimization –steepest descent /ascent method, constrained optimization - penalty function methods.

(12 Hrs)

Unit-IV

Dynamic Programming: Multistage decision process and concept of sub optimization, Bellemen's optimality principle, recursive relation – backward and forward recursion, inventory problem, capital budgeting and path finding problem by dynamic programming.

(12 Hrs)

RECOMMENDED BOOKS:

Title	Author	Publisher
Text Books		
Optimization-Theory and applications	S. S. Rao	Wiley Eastern
Optimization Methods	K. V. Mittal	Wiley Eastern
Reference Books		
Linear Algebra	K. Hoffman, R. Kunze	Prentice Hall
Non-Linear Programming Theory and Algorithms	Bazara, Sherali Shetty	John Wiley

IE-7105F

ENERGY MANAGEMENT & RENEWABLE ENERGY SOURCES

L T P
3 1 0

Credits:4

Unit I

Energy scenario: Commercial and non-commercial energy, primary energy resources, commercial energy production, final energy consumption, energy needs of growing economy, long term energy scenario, energy pricing, energy sector reforms, energy and environment, air pollution, climate change, energy security, energy conservation and its importance, energy strategy for the future.

(12 Hrs)

Unit II

Energy management and audit: Definition, energy audit – need, types of energy audit, energy management (audit) approach – understanding energy costs, benchmarking, energy performance, matching energy use to requirement, maximising system efficiencies, optimising the input energy requirements, fuel and energy substitution, energy audit instruments.

(06 Hrs)

Energy action planning: Key elements, force field analysis, energy policy purpose, perspective contents, formulation, ratification, organising, location of energy management, top management support, managerial function, roles and responsibilities of energy manager, accountability, motivating - motivation of employees, information system designing barriers, strategies, marketing and communicating, training & planning.

(12 Hrs)

Unit III

Solar Energy: Introduction to solar radiation and its measurement, Introduction to Solar energy Collectors and Storage, Application of solar energy: Solar thermal electric conversion, Thermal electric conversion systems, Solar electric power generation, Solar photo-voltatics, Solar Cell principle, Semiconductor junctions, Conversion efficiency and power output, Basic photo-voltaic system for power generation.

(06

Hrs)

Wind Energy: Introduction to wind energy conversion, the nature of the wind, Power in the wind, Wind Energy Conversion: Wind data and energy estimation, Site Selection considerations, basic Components of a Wind energy conversion system, Classification of WEC Systems, Schemes for electric generation using synchronous generator and induction generator, wind energy storage.

(06 Hrs)

Unit IV

Energy from Biomass: Introduction: Biomass conversion technologies, photosynthesis, Bio-gas generation, types of bio-gas plants, Biomass as a Source of Energy: Methods for obtaining energy from Bio-mass, Bio-logical conversion of Solar energy.

(04 Hrs)

Direct Energy Conversion Processes: Magneto Hydro Dynamic Power Generation: Principles of MHD power generation, Open cycle systems, Closed cycle systems, Voltage and power output, Materials for MHD generators; Thermo-Electric Generation: Basic principles of thermo-electric power generation, Seeback, Peltier, Thomson effects, Thermo-Electric power generator, Analysis materials; Thermionic Generation: Thermionic emission and work function, Basic thermionic generator; Fuel Cells: H₂, O₂ cells, classification of fuel cells, types, Advantages, Electrodes, Polarization.

(08 Hrs)

RECOMMENDED BOOKS:

Title	Author	Publisher
Text Books		
Guide to Energy Management	B. L. Capehart, Wayne C. Turner, William J. Kennedy	Fairmont Press
Energy Management	P R Trivedi, B R Julka	Commonwealth
Reference Books		
Renewable energy sources and conversion technology	Bansal N K, Kleemann M, Heliss M	Tata McGraw Hill
Non Conventional Sources of Energy	Rai G D	Khanna Publishers
Renewable Energy	Sorensen Bent	Academic Press

Unit-I

Supply System: Introduction to Transmission and Distribution systems, Comparison between DC and AC systems for Transmission and Distribution, comparison of cost of conductors, choice of working voltage for transmission & distribution, economic size of conductors - Kelvin's law, Radial & mesh distribution networks, Voltage regulation.

(06 Hrs)

General: Conductor materials; solid, stranded, ACSR, hollow and bundle conductors. Different types of supporting structures for overhead lines. Elementary ideas about transmission line construction and erection. Stringing of conductors, spacing, sag and clearance from ground, overhead line insulators, concept of string efficiency.

(06 Hrs)

Unit-II

Transmission Line Parameters: Introduction to line parameters, Resistance of transmission line, inductance of single phase two wire line, concept of G.M.D., Inductance of three phase line, Use of bundled conductor, transposition of power lines, capacitance of 1-phase and 3-phase lines. effect of earth on capacitance of conductors.

(05 Hrs)

Performance Of Transmission Lines: Representation of short transmission line, medium length line (nominal T & Π circuits). long length line by hyperbolic equations and equivalent T & Π circuits. Power flow through transmission lines, ABCD constants, Voltage regulation.

(07 Hrs)

Unit-III

Circle Diagram And Line Compensation: Receiving end circle diagram for long transmission lines based on ABCD constants, equivalent T circuits , power loss, surge impedance loading, reactive power requirement of system series and shunt compensation, Synchronous phase modifiers , rating of phase modifiers.

(12 Hrs)

Unit-IV

Underground Cables: Classification of cables based upon voltage and dielectric material, insulation resistance and capacitance of single core cable, dielectric stress, Capacitance of 3 core cables, methods of laying, heating effect, Maximum current carrying capacity, cause of failure, comparison with overhead transmission lines.

(12 Hrs)

RECOMMENDED BOOKS:**Title****Author****Publisher****Text books**

Course in Electrical Power
Power System Analysis

C.L. Wadhwa
Nagrath and Kothari

New Age
TMH

Reference Books

Electrical Energy System Theory- An introduction
Elements of Power System Analysis
Power System Analysis & Design

O.L. Elgerd
W.D. Stevenson Jr
B.R. Gupta

TMH
TMH
Wheeler

IE-7205B**NEURAL NETWORK AND FUZZY LOGIC****L T P**
3 0 0**Credits:3****Unit I**

Introduction: History of development in neural networks, neural network characteristics, Artificial neural network technology, Model of a neuron, topology, learning, types of learning, supervised, unsupervised and reinforcement learning.

(12 Hrs)

Unit II

Supervised Learning: Basic hop field model, the perceptron, linear separability, Basic learning laws, Hebb's rule, Delta rule, Widrow and Hoff LMS learning rule, correlation learning rule, In star and out star learning rules, Unsupervised learning, competitive learning, K mean clustering algorithm, Kolwner's feature maps.

(12 Hrs)

Unit III

Radial Basis Function: Basic learning laws in RBF network, recurrent networks, recurrent back propagation, Real time recurrent learning algorithm.

(04 Hrs)

Counter Propagation Networks: Introduction to counter propagation networks, CMAC networks, ART networks, Application of neural networks, pattern recognition, optimization, associative memories, vector quantization, control.

(08 Hrs)

Unit IV

Fuzzy Logic: Basic concepts of fuzzy logic, Fuzzy logic crisp set, Linguistic variable, Membership functions, Operation of fuzzy set, Fuzzy IF THEN rules, Variable inference techniques, Defuzzification techniques, Basic fuzzy inference algorithm, Application of fuzzy logic, Fuzzy system design, Implementation of fuzzy system, Useful tools supporting design.

(12 Hrs)

RECOMMENDED BOOKS:

Title	Author	Publisher
Text Books		
Fuzzy System Design Principles	Riza Berkin and Trubatch	PHI
Neural Networks	Simon Haykin	Pearson Education
Reference Books		
Artificial Neural Networks	Yegna Narayanan	MGH
An Introduction to Neural Networks	J A Anderson	PHI

Unit I

Introduction: Introduction to electromagnetic spectrum and microwaves, microwave propagation, microwave radiation hazards and applications of microwaves. (04 Hrs)

Microwave Tubes And Circuits: Microwave triodes. Frequency limitation of gridded tubes, UHF triodes and circuits, operation and practical consideration of multi-cavity klystron, reflex klystron, magnetrons and traveling wave tube (TWT)types, performance and applications of magnetron and TWT ,other microwave , tubes such as crossed field amplifiers, backward wave oscillators and miscellaneous tubes.

(08 Hrs)

Unit II

Waveguides, Resonators And Components: Types of wave -guides, introduction to rectangular wave-guides, reflection of waves from a conducting plane and parallel plane wave-guide, various modes in wave - guides cutoff, wavelength; λ_1 "wave-guides"guide' wavelength in phase velocity. characteristic wave impedance, circular and other waveguides; wave guides coupling, matching and attenuation, methods of exciting wave-guides, wave-guides joints, basic accessories, multiple junctions, impedance matching and tuning, bends, taper, twists, irises, attenuation in wave guides, resistive attenuators, Fundamentals and practical consideration of cavity resonators, auxiliary components. Directional couplers, isolators, circulators, mixers, detectors, detector mounts, switches microwave antennas-horn and lens antennas.

(12 Hrs)

Unit III

Semiconductor Microwave and Circuits: Passive microwave circuits-stripline and microstrip circuits and saw ; detectors, performance and applications of microwave transistors and integrated circuits- high frequency limitations, varactor diodes, step recovery diodes and frequency multipliers basic principles and circuits of parametric amplifiers, tunnel diodes, negative resistance amplifiers, tunnel diode applications, gunn effect, gunn diodes and their applications, avalanche effect, IMPATT and TRAPATT diodes, performance and applications of avalanche diodes, PIN diodes, Schottky barrier diodes and backward diodes, simulated emission, fundamentals of MASERSA, practical masers and their applications, fundamentals of lasers, CW lasers and their communication applications and other opto-electronic devices.

(12 Hrs)

Unit IV

Microwave Sensors and Measurements: Measurement of power, frequency and wavelength measurements, attenuation measurements, SWR measurements, Q-measurements of microwave cavities, introduction to microwave sensors, microwave passive sensors, block diagram of multi-meter-wave imaging radiometer, active microwave sensors, block diagram of pulsed radar, block diagram of CW radar sensor, altimeter (block diagram of FM-CW radar sensors), rate of climb meter, synthetic aperture radar sensor.

(12 Hrs)

RECOMMENDED BOOKS:

Title	Author	Publisher
Text Books		
Electronic communication systems	George Kennedy	TMH
Microwave Techniques	A. Kumar	Newage International
Reference Books		
Principles of communication Engg	Umesh Sinha	Satya Prakashan
Electronics Communications	Sanjeev Gupta	Khanna Publishers

IE-7205D**ADVANCED INSTRUMENTATION****L T P**
3 0 0**Credits:3****Unit-I**

Electronic Measuring Instruments: Advanced semescope and displays, high speed oscilloscope, sampling oscilloscope, DSO wave analyzer, distortion analyzer, modulation analyzer , spectrum analyzer, wave meters, digital phase meters, frequency synthesizer, logic state analyzer, LCR meters.

(12 Hrs)

Unit-II

Advanced Sensors: Current &.voltage sensors, intelligent pressure transducer, turbidity Measurement, microwave sensors as proximity sensors, semi-conductor displacement laser sensor, ceramic sensor as gas sensor.

(08 Hrs)

Vision Sensors: Overview, illumination consideration, vision sensors generalities, 2D sensor, 3D sensors, Interfacing of vision sensors.

(04 Hrs)

Unit-III

Optical Fiber Sensors: Introduction, Extrinsic & dynamic fiber optic sensor, elementary Principles ,the design of the optical fiber sensor, development of optical fiber sensor, phase modulated optical fiber sensors, frequency modulation in optical sensors, polarization modulation In fiber sensors, distributed optical fiber sensing (DOFS), distributed micro-bend strains sensor, distributed optical fiber temperature sensor, using the optical Kerr Effect, distributed optical fiber sensor for chemical species, fiber optic Sensor for air pollution, optical fiber pressure sensor, optical fiber pressure sensor ,optical fiber temperature sensor, optical fiber sensor for humidity.

(12 Hrs)

Unit-IV

Ultrasonic Instrumentation: Sirens, whistles, the wretch whistles, the liquid ultrasonic, generators, solid transducers, Piezoelectric transducers, magneto-strictive transducers, the production of very light intensities, depleted layer transducers, applications of ultrasonic processing, uses of ultrasonic in measurement & control , flow detection, application of ultrasonic to boilers.

(09 Hrs)

Tactile Sensors: Overview, touch sensing, tactile sensing, interfacing of tactile sensors.

(03 Hrs)

RECOMMENDED BOOKS:

Title	Author	Publisher
Text Books		
Principles of Measurement & Instrumentation	Allan Morris	PHI
Principles of Measurement System	J P Bartley	Longman London
Reference Books		
Sensors & Control System in manufacturing	Sabrie Soloman	McGraw Hill
Instrument Transducers	H K P Newbert	Clarendon
Modem Electronic Instrumentation & Measurement Techniques	Cooper & Helfrick	PHI

IE-7205E

WIRELESS AND MOBILE COMMUNICATION

L T P
3 0 0

Credits:3

Unit-I

Introduction to Wireless Communication Systems: Performance Criteria, Voice Quality, Service Quality, coverage and required grade of service The Cellular Concept, co-channel interference, Frequency reuse, determining the frequency reuse distance, channel assignment strategies, hand-off strategies, interference and system capacity, trunking efficiency, improving capacity of cellular system, cell splitting, sectoring Mobile Radio Environment.

(12 Hrs)

Unit-II

Mobile Radio Propagation: Introduction to radio wave propagation, free space propagation model, basic propagation mechanisms, reflection, diffraction, scattering, outdoor propagation models, indoor propagation models, signal penetration into buildings, small scale multipath propagation, types of small-scale fading, fading effects due to Doppler spread, diversity techniques.

(12 Hrs)

Unit-III

Modulation techniques: Introduction to linear modulation techniques, Minimum shift keying (MSK), Gaussian minimum shift keying (GMSK), OFDM, spread spectrum, correlation function, PN code generation, DS-SS, and FH-SS systems, performance of modulation schemes, RAKE receiver.

(12 Hrs)

Unit-IV

Multiple Access Techniques: Frequency management, fixed channel assignment, non-fixed channel assignment, FDMA, TDMA, spread spectrum multiple access, space division multiple access, spectral efficiency, capacity of cellular system.

(06 Hrs)

Concept of cellular communication: Basic wireless cellular system, mobile unit (MU), Base station, Mobile switching center, Introduction to GSM.

(06 Hrs)

RECOMMENDED BOOKS:

Title	Author	Publisher
Text Books		
Mobile cellular Tele-communication	William, C Y Lee	McGraw Hill
Wireless communication: Principles & practice	Theodore S. Rappaport	Pearson
Reference Books		
Wireless Digital Communication	Kamilo Feher	PHI
Digital Communication	J.G. Proakis	McGraw Hill

Unit-I

Overview: Overview of biosensors and their electrochemistry: Molecular reorganization: enzymes, Antibodies and DNA, Modification of bio recognition molecules for Selectivity and sensitivity Fundamentals of surfaces and interfaces.

(12 Hrs)

Unit-II

Bioinstrumentation: Bioinstrumentation and bioelectronics devices: Principles of potentiometry and potentiometric biosensors, principles of amperometry and amperometric biosensors, Optical Biosensors based on Fiber optics, FETs and Bio-MEMS, Introduction to Chemometrics, biosensor arrays; electronic nose and electronic tongue.

(12 Hrs)

Unit-III

MEMS Technology: MEMS Technology: Introduction Nanotechnology and MEMS, MEMS design, and fabrication technology, Lithography, Etching, MEMS material, bulk micromachining, Surface micromachining, Microactuator, electrostatic actuation Micro-fluidics.

(12 Hrs)

Unit-IV

Applications: MEMS types and their applications : Mechanical MEMS □ strain and pressure sensors, accelerometers etc., Electromagnetic MEMS, micromotors, wireless and GPS MEMS etc Magnetic MEMS, all effect sensors, SQUID magnetometers, Optical MEMS, micromachined fiber optic component, optical sensors, Thermal MEMS, thermo-mechanical and thermo-electrical actuators, Peltier heat pumps.

(12 Hrs)

RECOMMENDED BOOKS:**Title****Author****Publisher****Text Books**

Foundation of MEMS
Microsensors, MEMS and Smart
Devices

Chang
Julian W. Gardner, Vijay
Varadan & Osama O.
Awadelkarim

Illinois Ece Series
Wiley

Reference Books

Biosensors: Theory and Applications
Electrochemical Sensors, Biosensors
and their Biomedical Applications

Donald G. Buerk
Xueji Zhang, Huangxian Ju &
Joseph Wang

CRC
Academic Press

IT-7104A OBJECT ORIENTED MODELING AND DESIGN

L T P
3 1 0

Credits-4

UNIT I

Object oriented concept: Object Oriented Concept- Object Oriented Development and Themes, Object Oriented Modeling Techniques – object model, dynamic model, functional model, and relationship among model.

Object Modeling – Objects & Classes, Object Diagram, Attributes, Operation and Methods, Link and Association, Advanced Link Association Concepts - roll names, ordering, qualification, aggregation, generalization and inheritance, overriding features, Advance Object Modeling – aggregation vs. association, aggregation vs. generalization, propagation of operation, abstract classes, overriding operation, multiple inheritance, metadata, candidate keys, constraints.

(13 Hrs)

UNIT II

Dynamic Modeling - Events and States, Operations, Nested State Diagram, Advance Dynamic Modeling Concepts, Relation of Object and Dynamic Model.

Functional Modeling – Functional Model, Data Flow Diagrams, Specifying Operation, Constraints, Relation of Functional to Object and Dynamic Models.

(10 Hrs)

UNIT III

System Design – Overview of System Design, Breaking System into Subsystem, Identifying Concurrency, Allocating Subsystem to Processors and Tasks, Management of Data Stores, Handling Global Resources, Handling Boundary Conditions, Common Architecture Frameworks.

Object Design – Designing Algorithms, Design Optimization, Implementation of Control, Adjustment of Inheritance, Design of Association, Object Representation & Comparison of Design Methodologies – SA/SD, OMT and JSD.

(13 Hrs)

UNIT IV

From Design to Implementation, Object oriented programming style – reusability, extensibility, robustness, Translating Design to Implementation – class definition, creating objects, calling operation, using inheritance, implementing associations, Object Oriented Language Features.

(12 Hrs)

Recommended Books:

Title	Author(s)	Publisher
Text Object Oriented Modeling & Design	James Rumbaugh	PHI
Object Oriented Software construction	Bertrand Meyer	PHI
Reference Object Oriented Programming	Brad J.CoX,	Addison Wesley

Unit I

Introduction to Distributed Systems: Definition of distributed systems, their objectives, types, hardware and software concepts, architecture, introduction to XML, SOAP, Web and Grid services concepts.

(12 Hrs)

Unit II

Communication: Interprocess communication, Remote Procedure Call (RPC), Remote Method Invocation (RMI), Remote Object Invocation, Message Oriented Communication.

Processes: Introduction to threads, Threads in distributed and non distributed systems, Client side software, Design issues for Servers, Software agents.

(12 Hrs)

Unit III

Naming: General issues with respect to naming, Name resolution, implementation of a name space, Domain name Systems, X.500 name space.

Security: Introduction to security in distributed systems, General issues in authentication and access control, Security management: Key management, secure group management, authorization management; examples: Kerberos, x.509 certificates.

(12 Hrs)

Unit IV

Distributed Object-based Systems: Introduction to distributed object based systems, Overview of CORBA and DCOM and their comparison.

Distribute File System and Document-based Systems: Introduction to distributed file system, distributed document-based systems, their examples.

(12 Hrs)

Recommended Books:

Title	Author(s)	Publisher
Text Distributed Systems, Principles and Paradigms	Andrew S Tanenbaum, and Maarten van Steen	Pearson Education
Distributed Systems Concepts and Design	George Coulouris, Jean Dollimore, TIM Kindberg,	Addison Wesley

IT-7105B CLIENT SERVER ARCHITECTURE

L T P
3 1 0

Credits-4

Unit I

Fundamental of Distributed Systems: Client/Server technology an introduction, Classification – Mainframe, File sharing, Client/Server, Distributed/Collaborative architecture, Distributed Computing Environment–DCE architecture, Type of Client/Server Architecture – Two- tier architecture, Three-tier architecture, Distributed/Collaborative enterprise architecture, Complementary Technologies to 3-tier – Object – oriented Design, Database Two Phase Commit Processing, Remote Procedure Call, Message Oriented Middleware.

(12 Hrs)

Unit II

Distributed Computing Environment: Structure – Client/Server Model, Defining distributed Environment, Motivation for Distributed Computing, Developing the Distributed Computing Architecture Framework, Fundamental Technologies & Design Mechanism.

Remote Method Invocation: Distributed Object Model, RMI System Overview, Client interfaces, Registry interfaces, Remote object interface, Stub interface, Exception in RMI.

(12 Hrs)

Unit III

Distributed Component Object Model: The DCOM Architecture, Component & Reuse, Location Independence, Language Neutrality, Connection Management, Scalability, Performance, Bandwidth & Latency, Security, Local Balancing, Fault Tolerance, Ease of Deployment, Protocol Neutrality, Platform Neutrality, Seamless Integration with other Internet Protocols.

(12 Hrs)

Unit IV

The Common Object Request Broker: Overview of CORBA, The object request Broker, OMG Interface Definition Language, Language Mapping, Interface Repository, Stubs & Skelations, Dynamic Invocation & Dispatch, Object Adapters, and Introduction about Java IDL (Interface Deference Language).

(12 Hrs)

Recommended Books:

Title	Author(s)	Publisher
Text Object-oriented Design, Architecture and Implementation.	P.M. Heinchieus	Addison Wesley
Reference An Advance Course on Distributed Computing	Fingerlakes,	ACM Press Publication.

Unit-I

Data Mining: Introduction, Relational Databases, Data Warehouses, Transactional databases, Advanced database Systems and Application, Data Mining Functionalities, Classification of Data Mining Systems, Major Issues in Data Mining.

(12 Hrs)

Unit-II

Data Warehouse: Introduction, A Multidimensional data Model, Data Warehouse Architecture, Data Warehouse Implementation, Data Cube Technology, From Data warehousing to Data Mining.

Data Processing: Data Cleaning, Data Integration and Transformation, Data Reduction, Discretization and concept Hierarchy Generation, Data Mining Primitives, Languages and System Architecture: Data Mining Primitives, DMQL, Architectures of Data Mining Systems.

(12 Hrs)

Unit-III

Concept Description: Data Generalization & Summarization – Based Characterization, Analytical Characterization, Mining class Comparisons, Mining Descriptive Statistical Measures in Large Databases.

Mining Association Rules in Large Databases: Association Rule Mining, Single – Dimensional Boolean Association Rules, Multilevel Association Rules from Transaction Databases, Multi Dimensional Association Rules from Relational Databases, From Association Mining to Correlation Analysis, Constraint – Based Association Mining.

(12 Hrs)

Unit-IV

Classification and Prediction: Classification & Prediction, Issues Regarding Classification & Prediction, Classification by decision Tree Induction, Bayesian Classification, Classification by Back propagation, Classification based on concepts & Association Rule, Other Classification, Prediction, Classification Accuracy.

Cluster Analysis: Types of Data in Cluster Analysis, Partitioning methods, Hierarchical methods, Density – Based Methods, Grid – Based Methods, Model – Based Clustering Methods, Outlier Analysis.

(12 Hrs)

Recommended Books:

Title	Author(s)	Publisher
Text Data Mining Concepts & Techniques	Jiawei Han &, Micheline Kamber	Harcout India,
Data Mining	I.H. Witten E. Frank,	Morgan Kaufman
Reference Mastering Data Mining	Michael J.A. Berry, Gorgon S. Linoff	Wiley Publication.

UNIT-I

Introduction: Visual programming basics, Application framework fundamental, windows programming (Win32 programming), and visual c++.memory management, DLLs,Win32 API.

(12 Hrs)

UNIT-II

Visual C++ components: Resource compiler, MFC, modal Dialog, Windows Common Control, the Modeless Dialog and Windows Common Dialogs, ActiveX Control, Bitmap, Reading and Writing Documents, SDI,MDI applications.

(12 Hrs)

UNIT-III

Socket Programming using Win Sock, TCP/IP, Document-View Structure, MFC Libraries viz Cview, Cfile, Cpoint, Cdialog.

(12 Hrs)

UNIT-IV

WIN32 Programming: WIN32 programming, Difference between a Windows program and a typical DOS program, Windows Programming modal, Windows Memory management, A skeletal Windows Application: WinMain function, Window Function, Components of a Skeletal Application, Windows style, Device context, Creation of LISTBOX class, Dialog Boxes and SCROLLBAR class.

(12 Hrs)

Recommended Books:

Title	Author(s)	Publisher
Text VISUAL C++ programming	David J. Kruglenski	Microsoft Press
WIN32 Programming	Newcomer	Addison – Wesley
Reference Programming Windows 3.1	Charles Petzold	Microsoft press.

IT-7204A

INTERNETWORKING WITH TCP/IP

L T P
3 1 0

Credits-4

UNIT-I

Introduction: Layering, TCP/IP Layering Internet Addresses The Domain Name System Client Server Model, Port Numbers Implementations and Application Programming Interfaces.

The Link Layer: Ethernet and IEEE 802 Encapsulation Trailer Encapsulation SLIP: Serial Line IP, Compressed SLIPP PPP: Point – to Point Protocol.

(12 Hrs)

UNIT-II

IP The Internet Protocol: IP Header, IP Routing, Subnet Addressing, Subnet Mask, Special Case IP Addresses.

Introduction to ARP and RARP: ARP packet format, Proxy ARP, RARP Packet Format

ICMP: Introduction, ICMP, Message Types, ICMP Address, Mask Request and Reply.

(12 Hrs)

UNIT-III

IP Routing: Routing Principles, Introduction to Dynamic Routing

UDP: UDP Header, UDP Checksum

DNS: DNS Basics, DNS Message Format, security.

(12 Hrs)

UNIT-IV

TCP: TCSP Services, TCP Header, TCP Connection Establishment and Termination, TCP Timeout and Retransmission, Repacketization.

Telnet and Rlogin, FTP

(12 Hrs)

Recommended Books:

Title	Author(s)	Publisher
Text TCP/IP Illustrated Internetworking with TCP/IP	Richard Stevens Comer	Addison Wesley PHI

UNIT-I

Basics of Multimedia Technology: Computers, communication and entertainment; multimedia an introduction; framework for multimedia systems; multimedia devices; CD-Audio, CD-ROM, CD-I, presentation devices and the user interface; multimedia presentation and authoring; professional development tools; LANs and multimedia; internet, World Wide Web & multimedia distribution network-ATM & ADSL; multimedia servers & databases; vector graphics; 3D graphics programs; animation techniques; shading; anti aliasing; morphing; video on demand.

(12 Hrs)

UNIT-II

Image Compression & Standards: Making still images; editing and capturing images; scanning images; computer color models; color palettes; vector drawing; 3D drawing and rendering; JPEG-objectives and architecture; JPEG-DCT encoding and quantization, JPEG statistical coding, JPEG predictive lossless coding; JPEG performance; overview of other image file formats as GIF, TIFF, BMP, PNG etc.

(12 Hrs)

UNIT-III

Audio & Video: Digital representation of sound; time domain sampled representation; method of encoding the analog signals; subband coding; fourier method; transmission of digital sound; digital audio signal processing; stereophonic & quadraphonic signal processing; editing sampled sound; MPEG Audio; audio compression & decompression; brief survey of speech recognition and generation; audio synthesis; musical instrument digital interface; digital video and image compression; MPEG motion video compression standard; DVI technology; time base media representation and delivery.

(12 Hrs)

UNIT-IV

Virtual Reality: Applications of multimedia, intelligent multimedia system, desktop virtual reality, VR operating system, virtual environment displays and orientation making; visually coupled system requirements; intelligent VR software systems, Applications of environment in various fields.

(12 Hrs)

Recommended Books:

Title	Author(s)	Publisher
Text		
An introduction to Multimedia	Villamil & Molina	Mc Milan
Multimedia: Sound & Video	Lozano	PHI
Reference		
Multimedia: Production, planning and delivery	Villamil & Molina, Que	
Multimedia on the PC	Sinclair	BPB
Multimedia: Making it work	Tay Vaughan	TMH
Multimedia in Practice	Jeff coate Judith	PHI
Multimedia Systems	Koegel	AWL
Multimedia Systems	John .F. Koegel, Buford.	

UNIT-I

Basics of Computer & Internet Technology: Internet, ISP & domain name; Network Security; Encryption Techniques and Algorithms; Digital Signatures.

Introduction to Cyber World: Introduction to Cyberspace and Cyber Law; Different Components of cyber Laws; Cyber Law and Netizens.

(11 Hrs)

UNIT-II

E-Commerce: Introduction to E-Commerce; Different E-Commerce Models; E-Commerce Trends and Prospects; E-Commerce and Taxation; Legal Aspects of E-Commerce.

(11 Hrs)

UNIT-III

Intellectual Property Rights (IPR): IPR Regime in the Digital Society; Copyright and Patents; International Treaties and Conventions; Business Software Patents; Domain Name Disputes and Resolution.

(13 Hrs)

UNIT-IV

IT Act, 2000: Aims and Objectives; Overview of the Act; Jurisdiction; Role of Certifying Authority; Regulators under IT Act; Cyber Crimes-Offences and Contraventions; Grey Areas of IT Act.

Project Work: Candidates will be required to work on a project. At the end of the course students will make a presentation and submit the project report.

(13 Hrs)

Recommended books:

Title	Author(s)	Publisher
Text A Guide to Cyber Laws & IT Act 2000 with Rules & Notification Cyber Cops, Cyber Criminals & Internet	Nandan Kamath. Keith Merill & Deepti Chopra	
References Information Technology Law Handbook of Cyber Laws	Diane Row Land Vakul Sharma	Mc Millian

ME-7106A MAINTENANCE ENGINEERING

L T P
3 1 0

Credits:4

UNIT-I

Concept and Objectives of Maintenance: Introduction to maintenance, function, objectives, Types of maintenance, maintenance organizations and its types, training of maintenance personal, need of training on job and off job training, concept of reliability, availability, maintainability, MTBF,MTTF

(12 Hrs)

UNIT-II

Maintenance Planning and Scheduling: Maintenance planning, benefits of planning, types of maintenance plans, manpower planning, job planning, maintenance planning, maintenance scheduling, maintenance literature like maintenance manuals, work order, job order, history cards, master inspection check list.

(12 Hrs)

UNIT-III

Preventive Maintenance and Failure Analysis: Elements of preventive maintenance, simple examples of preventive maintenance, procedures in industry. Defect generation, Types of failure, defect reporting, defect analysis, equipment downtime analysis, break down analysis (FTA, FMEA, FMECA).

(12 Hrs)

UNIT-IV

Computer Managed Maintenance System: Objectives, approach towards computerization, equipment classification, classification of breakdown, material and facilities, job sequence and preparation of work order and schedules, Material management module, cataloguing and codification of spares and consumables. Introduction to CBM, online offline monitoring, visual monitoring, temperature monitoring, leakage monitoring

(12 Hrs)

Recommended Books:

Title	Author(s)	Publisher
Industrial Maintenance Management	Sushil Kumar Srivastava	S Chand & Co.
Maintenance Engineering	H. P. Garg	S Chand & Co.
Maintenance Engineering Hand Book	Higgins & Lindlay	
Maintenance Engineering	Mishra	PHI

ME-7106B CONCURRENT ENGINEERING

L T P
3 1 0

Credits:4

UNIT-I

Introduction: Concurrent Engineering Definition, Product life cycle, quality products, evaporative markets, globalization and concurrent engineering

(12 Hrs)

UNIT-II

Concurrent Engineering Techniques: Review of concurrent engineering techniques like DFM (design for manufacture), DFA (design for assembly), QFD (quality function deployment), RP (rapid prototyping), TD (total design) for integrating these technologies.

(12 Hrs)

UNIT-III

Product Design & Development Process: Product information systems and their Mechanical Engineering architecture, Information environment for Suppliers, management, testing & inspection design engineering, purchasing, process control, manufacturing, support plans, operators, quality control, servicing and maintenance.

(12 Hrs)

UNIT-IV

Product and Process Integration: Product information modeling, Integration of information models and end users applications, Computer aided simultaneous engineering systems, Integrated concurrent design and product development, Constraint networks.

(12 Hrs)

Recommended Books:

Title	Author(s)	Publisher
Integrated Product and Process Development	John M. Usher, Utpal Roy and H. R. Parasaei	Tata McGraw Hill
Product Design and Manufacture	A. K. Chitale and R. C. Gupta	PHI
Engineering Design and Design for Manufacturing: A structured approach	John R. Dixon and Corrado Poli	Field Stone Publishers, USA
Material Selection in Mechanical Design	M. F. Ashby	Elsevier
Concurrent Engineering	Biren Prasad	Prentice Hall
Product Design & Development	Karl T. Ulrich, Steven D. Eppinger	TMHI

ME-7106C ARTIFICIAL INTELLIGENCE

L T P
3 1 0

Credits:4

UNIT-I

Introduction: Artificial intelligence, importance of AI, AI and related fields, Historical background of AI.

Knowledge: Knowledge based systems, LISP and other AI programming languages system and numeric fns, Functions, predicates, conditionals, input, output and local variables, iteration and recursion, property lists and arrays, PROLOG and other AI programming languages.

(12 Hrs)

UNIT-II

Knowledge Representation: Formalized symbolic logics, dealing with inconsistencies and uncertainties, truth maintenance systems: default reasoning and closed world assumption, Modal and temporal logics, fuzzy logic and Natural language computations, probabilistic reasoning, Bayesian probabilistic inference, possible world representations, Dempster- Shafer theory, Adhoc methods, heuristic reasoning methods. Structured knowledge: graphs, frames and related structures. Object oriented representations.

(12 Hrs)

UNIT-III

Knowledge Organization and Manipulation: Search and control strategies, matching techniques, fuzzy matching algorithms, knowledge organization and management.

Knowledge Perception and Communication: Natural language processing, pattern recognition - the recognition and classification process, learning classification patterns, Recognizing and understanding speech, Visual image understanding.

(12 Hrs)

UNIT-IV

Knowledge Acquisition: General concepts, type of learning, general learning model, performance measures, Genetic algorithms, intelligent editors, learning by induction, Analogical and explanation-based learning.

(12 Hrs)

Recommended Books:

Title	Author(s)	Publisher
AI	Rich	McGraw Hil
Principles of AI	Neilson	Springer Verlag
AI	Winston	Addison Wesley
Introduction to AI and expert systems	Don W. Patlason	Eastern Eco

ME-7106D COMPOSITE MATERIALS

L T P
3 1 0

Credits:4

UNIT-I

General Introduction: Historical background; Definition; Types of composite: polymer matrix composite, metal matrix composite, ceramic matrix composite; interaction between constituents and the concept of load transfer

Fibers and Matrices: Reinforcements; strength of reinforcement. Matrices Different types: Polymer matrix material; metal matrix material; ceramic matrix material

(12 Hrs)

UNIT-II

Strength of Composites: Failure modes of long fiber composites; tensile failure; failure in compression; shear failure

Composite Models: Law of mixtures, shear lag model, laminated plate model, Eshelby's model, others models

(12 Hrs)

UNIT-III

Fabrication of Composites: Fabrication of polymer matrix composite: liquid resin impregnated routes, pressurized consolidation of resin prepegs, consolidation of resin moulding compounds, injection moulding of thermoplastics, hot press moulding of thermoplastics.

Fabrication of Ceramic Composites: powder based routes, reactive processing, layered ceramic composites

(12 Hrs)

UNIT-IV

Processing of Metal Matrix Composites: Diffusion bonding, casting fiber reinforced metal matrix composite, powder techniques in processing of metal matrix composites, deposition technologies for MMC fabrication, In-situ reinforcement of MMC

Application of Composites: Some case studies and examples

(12 Hrs)

Recommended Books:

Title

Composite Materials
Metal Matrix Composites
Introduction to Metal Matrix
Composite

Author(s)

S. C. Sharma
R.K.Everett & R.J Arsenault
T.W Clyne & P. J. Wither

Publisher

Narosa Publishers
Academic press
Cambridge Univ.
Press

UNIT-I

Introduction: Introduction to Physical System Dynamics

Modeling of Physical System Dynamics: A Unified Approach, Physical systems, Introduction to Bond graphs, Ports, Bonds and Power; Elements of Bond graphs:1-port elements – resistor R, Stiffness C, and Inertia I, Source of Effort Se and Flow SF; 2-port elements – Transformer TF and Gyrator GY, with modulation, Junction elements 1 and 0; Causality, Causality for basic 1-port and multi-ports, Derivation of System equations from Bond graphs in first order state space form.

Bond Graph Modeling of Multi-energy Systems: Mechanical Systems, Translation and rotation (about a fixed axis)

(12 Hrs)

UNIT-II

Electrical Systems, Electromechanical Systems, Fluid systems, Transducer models–cylinder, rack and pinion, electromechanical transducers, pumps – positive displacement and centrifugal pump, gear trains, etc.

Analysis of Linear Systems: Free & forced response for first and second order systems, Undamped & damped oscillator, Derivation of Signal flow graphs from Bond graphs, Derivation of Transfer functions

(12 Hrs)

UNIT-III

Bode plots, State Variable Analysis, State transition matrix, Characteristic equation, Eigen values and Eigen vectors, their impact on system response, Similarity transformations and their properties, Controllability and Observability, Canonical forms, Controllable, Observable, Diagonal

(12 Hrs)

UNIT-IV

Stability Criteria: Routh-Hurwitz criterion

Controllers: Proportional Integral and Derivative feedback

Simulation: Computer simulation of Dynamic Systems using Bond graphs

(12 Hrs)

Recommended Books:

Title	Author(s)	Publisher
System Dynamics: Modeling and Simulation of Mechatronics Systems	Karnopp, Margolis, Rosenberg	Wiley
System Dynamics: A Unified Approach	Karnopp, Margolis & Rosenberg	Wiley
Modeling & Simulation of Engineering Systems through Bond Graphs	Amalendu Mukherjee	Narosa
Bond Graph in Modeling, Simulation and Fault Identification	R. Karmakar	I. K. Int. Pub. House
	Amalendu Mukherjee, Ranjit Karmakar	
	Arun Kumar Samantaray	
System Dynamics & Control	Eronini Umez-Eronini	Cole Publishing Co.
Feedback Control Systems	B.C.Kuo	Prentice Hall.
Modern Control Engineering	K.Ogata	Prentice Hall
Control Systems Design	Bernard Friedland	McGraw-Hill

ME-7106F**NON CONVENTIONAL ENERGY RESOURCES****L T P**
3 1 0**Credits:4****UNIT-I**

Introduction: Renewable and non-renewable energy sources, their availability and growth in India: energy consumption as a measure of Nations Development: strategy for meeting the future energy requirements.

Solar Energy: Solar radiations-beam and diffuse radiations; earth sun angles, attenuation and measurement of solar radiations; Optical properties of materials and selective surfaces.

(12 Hrs)

UNIT-II

Solar Energy Equipments: Principles, introduction to different types of collectors, flat plate, cylindrical and parabolic collectors; Solar energy storage systems-their types, characteristics and capacity; solar ponds. Application of solar energy in water, space and process heating, solar refrigerant and air conditioning; water desalination and water pumping; Solar thermal power generation; solar cells and batteries

Wind Energy: Principle of wind energy conservation; basic components of wind energy conversion systems; wind mill components, various types and their constructional features; wind data and site selection considerations.

(12 Hrs)

UNIT-III

Direct Energy Conversion Systems: i) Magnetic Thermodynamic (MHD) Generators; Operating principle, types and working of different MHD system –their relative merits; MHD materials and production of magnetic fields ii) Thermo-Electric Generators; Thermo-electric effects and materials; thermoelectric devices and types of thermo-electric generators; thermo-electric refrigeration iii) Thermionic Generators; Thermionic emission and materials; working principle of thermionic convertors iv) Fuel Cell; Thermodynamic aspect; types, components and working of fuel cell. Performance, applications and economic aspects of above mentioned direct energy conversion systems.

(12 Hrs)

UNIT-IV

Miscellaneous Non-Conventional Energy Systems: i) Bio-Mass; Concept of bio-mass conversion, photo-synthesis and bio-gasification; bio gas generators and plants, their types constructional features and functioning; fuel properties of bio gas and community bio gas plants ii) Geothermal; Sources of geothermal energy types, constructional features and associated prime movers iii) Tidal and Wave Energy; Basic principles and components of tidal and wave energy plants; single basin and double basin tidal power plants; conversion devices, Advantages/disadvantages and applications of above mentioned energy systems.

(12 Hrs)

Recommended Books:

Title	Author(s)	Publisher
Solar Energy: Fundamentals and Applications	Jai Prakash, H.P. Garg	Tata McGraw-Hill.
Solar Energy: Principles of thermal collection & storage .	S.P. Sukhatme	Tata McGraw-Hill
Solar Engineering of Thermal Process, Energy conversion.	Duffie Beckman Chang	John Willey Publishers Prentice Hall.

UNIT-I

Mechanical Vibrations: Basic Concepts :Importance and scope, definition and terminology, vector method of representing harmonic motions, introduction to various types of vibrations and types of excitation .

Undamped Free vibrations: Single degree of freedom: D'Alembert's Principle, Energy method, Rayleigh method, simple applications of these methods, equivalent spring stiffness.

(12 Hrs)

UNIT-II

Damped Free Vibrations: Single degree of freedom systems: viscous damping, different types of damping, sub-critical, critical and over-critical damping, logarithmic decrement frequency of damped-oscillations

Damped Force Vibrations: Single degree of freedom systems: Steady state solution with viscous damping, simple harmonic excitation, base excitation, vibration isolation and transmissibility, principles of vibration measuring and seismic instruments, whirling of shafts without friction

(12 Hrs)

UNIT-III

Two Degree of Freedom Systems: Normal modes vibrations, natural frequencies, amplitude ratio, force harmonic vibrations

Applications: Vibrations absorber-principle, centrifugal pendulum vibration absorber, torsional vibration damper, untuned vibration damper , gyroscopic effect on rotating shafts, torsional vibration of two rotor systems

(12 Hrs)

UNIT-IV

Multi-Degree of Freedom Systems: Undamped free vibrations: Reciprocity theorem, Rayleigh and Dunkerely methods, simple torsional and geared systems

Continuous Systems: Vibration of a string, longitudinal vibrations of bars, Euler's equation of motion for beam vibration, natural frequencies for various end conditions torsional vibrations of circular shafts.

(12 Hrs)

Recommended Books:**Title**

Mech. Vibrations
Engg. Vibration
Vibration Problem in Engg.
Vibration for Engineers
Mechanical Vibrations
Mechanical Vibration

Author(s)

A.H. Church-
Lyark S. Jacobsen
S. Timoshenko
K.K. Pujara
G.K. Grover
Tse-Morse & Hinkle

Publisher

John Wiley & Sons
McGraw Hill Book Co.
Van Nostrand Co.
Dhanpat Rai & Sons
New Chand, Roorkee

ME-7207A FINITE ELEMENTS METHODS

L T P
3 1 0

Credits:4

UNIT-I

Introduction: Historical Background, Stresses and equilibrium, Boundary Conditions, Strain-Displacement Relations, Stress-Strain Relations, Temperature Effects, Vectors and Matrices.

Introduction & Fundamental Concepts: Rayleigh-Ritz Method, Galerkin's Method, Point Collocation Method, Least Square Method, Weighted Residual Method.

(12 Hrs)

UNIT-II

1-D FE Modeling: Finite Element Modeling, Coordinates and Shape Functions, The Potential Energy Approach, The Galerkin Approach, Assembly of Global Stiffness matrix and Load vector, Properties of Stiffness Matrix, Treatment of Boundary Conditions and Temperature Effects.

2-D FE Modeling: Finite Element Modeling, Constant Strain Triangle (CST).

(12 Hrs)

UNIT-III

2-D FE Modeling: The Four Node Quadrilateral, Numerical Integration, Higher Order Elements; Nine Node Quadrilateral, Eight Node Quadrilaterals, Six Node Triangle.

Truss: Introduction, Plane Trusses, Assembly of Global Stiffness Matrix and Load Vector, (For 1D and 2D problems only).

(12 Hrs)

UNIT-IV

Scalar Field Problems: Introduction, Steady-state heat transfer, Potential Flow, Fluid Flow in ducts.

Dynamic Considerations: Element Mass Matrices, Evaluation of Eigen Values and Eigen Vectors. (Introduction only)

Computer Implementation: Introduction; Computer Program Organization for Calculation of System Matrices

(12 Hrs)

Recommended Books:

Title	Author(s)	Publisher
Introduction to Finite Elements in Engineering	Chandrupatla, Belegundu	PHI
Finite Element Procedures	Bathe	PHI
An Introduction to Finite Element Method	Reddy	TMH

UNIT-I

Air Refrigeration Systems: Introduction, types of air refrigeration systems, reversed control cycle, Bell Coleman air refrigerator, Necessity of air-craft refrigeration, regenerative and reduced ambient type cycles, compression and bootstrap cycle.

(12 Hrs)

UNIT-II

Refrigeration Systems: Vapor compression refrigeration system, T-S, H-S, P-H diagram for VCR, COP. Performance of VCR, advantages and disadvantages, Methods for improving COP, Multiload system, Single and multi stage compressions, Introduction, actual aqua ammonia absorption system, electrolux refrigerator, COP Compression between VCR and absorption refrigeration system.

(12 Hrs)

UNIT-III

Refrigerants and Refrigeration Equipments: Classifications of refrigerants, properties of ideal refrigerants, anti-freeze solutions, selection of refrigerants, nomenclature of refrigerants, Ozone layer depletion, eco-friendly refrigerants, Construction details of different types of compressors, condensers, evaporator, expansion devices, dehydrators.

(12 Hrs)

UNIT-IV

Air Conditioning Systems: Types of air-conditioning systems, central AC, unitary AC load circulation load calculation based on various parameters, like solar radiations, transmission through building, fresh air ventilation occupancy load, internal heat gain such as lights, appliances, machine etc, state and quantity of supply air for different type of air-conditioning system.

(12 Hrs)

Recommended Books:

Title	Author(s)	Publisher
Refrigeration and Air conditioning	C. P. Arora	TMH
Refrigeration and Air conditioning	Domkondwar	Khanna
Refrigeration and Air conditioning	Balleney	Khanna
Ref and Air Conditioning	Gupta & Prakash	New Chand

UNIT-I

Introduction to Robotics- Kinematics & Dynamics of Robotic Linkages (Open Ended Type Manipulators): Frames, Transformations, Translation and rotation, Denavit-Hartenberg parameters, Forward and Inverse Kinematics

(12 Hrs)

UNIT-II

Jacobian, Equations of motion, Newton-Euler formulations

(12 Hrs)

UNIT-III

Sensors and Actuators: Strain gauge, resistive potentiometers, Tactile and force sensors, tachometers, LVDT, Piezo-electric accelerometer, Hall effect sensors, Optical Encoders, Pneumatic and Hydraulic actuators, servo valves, DC motor, stepper motor, drives

(12 Hrs)

UNIT-IV

Control of Manipulators: Feedback control of II order Linear systems, Joint control, Trajectory control, Controllers, PID control

Robot Programming: Language-overview, commands for elementary operations.

(12 Hrs)

Recommended Books:

Title	Author(s)	Publisher
Introduction to Robotics: Mechanics and Control	John J. Craig	Addison-Wesley
Foundations of Robotics	Tsuneo Yoshikawa	MIT Press
Robot Dynamics and Control	Spong M.W., Vidyasagar M	John Wiley & Sons
A Mathematical Introduction to Robotic Manipulation	Murray R. M., et al	CRC Press
Kinematics, Dynamics and Design of Machinery	Waldron K.J., Kinzel, G.L.,	John Wiley & Sons
System Dynamics & Control, Brooks	Eronini Umez-Eronini	Cole Publishing Co.
Bond Graph in Modeling, Simulation and Fault Identification	Amalendu Mukherjee, Ranjit Karmakar Arun Kumar Samantaray	I. K. International Pub. House Pvt. Ltd.

ME-7207D

MANAGEMENT INFORMATION SYSTEM

L T P
3 1 0

Credits:4

UNIT-I

Introduction: Definition of data and information, Value of Information, types of information and their characteristics, data management, knowledge Management, concept of management information, decision support system, system approach, MIS organization within organization

(12 Hrs)

UNIT-II

Organizational Issue: Types of organizations, Management and organizational behavior, impact of information system on the organization, organizational structure and individuals, top management and information systems, impact of computing, information processing & technology, management committees, holistic system approach.

(12 Hrs)

UNIT-III

Information System for Decision Making: Evaluation of information system, basic information system, basic information systems, decision assisting information systems and end user computing. Decision making and MIS, MIS as a technique for making programmed decision

Strategic and Project Planning of MIS: General business planning, appropriate MIS response, General MIS planning.

(12 Hrs)

UNIT-IV

Conceptual System Design: Defining the problem, system objectives, system constraints, information needed, information sources, development of alternative, conceptual designs and selection of optimum one, documentation of system, conceptual design reports, implementation of MIS and future trends.

(12 Hrs)

Recommended Books:

Title	Author(s)	Publisher
Management Information System	Rober G and Murdick	Prentice Hall
Information System Concepts for Management	Henry Lucas	McGraw-Hill,
Hand Book of Engineering Management	Dennis Lock	Gower Publishing Company

ME-7207E AUTOMOBILE ENGINEERING

L T P
3 1 0

Credits:4

UNIT-I

Introduction-Automobile Engine Components: Engine fundamentals, engine operations, engine type and construction, connecting rods, rod bearings, piston rings, crank shaft, cylinder blocks, valves & valves train, engine measurement and performance.
(12 Hrs)

UNIT-II

Automotive Engine System: Automotive engine fuels, fuel and exhaust system, carburetors, carburetor fuel system service, diesel fuel engines injection system, gasoline fuel injection system, engine lubricating system, engine cooling systems, emission control & tune up.
(12 Hrs)

UNIT-III

Automotive Chassis: Spring and suspension system, steering systems, automobile clutches, hydraulically operated clutch, pressure plate, fly wheel, adjusting wheel, spacing, and automotive brake system.

Automotive Transmission: Gear ratio, types of gear, types of gear box, working of gear box, Gear selector mechanism, planetary type gear box, universal joints, and differentials and drive axles.
(12 Hrs)

UNIT-IV

Automotive Electronic and Electrical Equipment: The automotive electrical system, starting system, central point ignition, electronic ignition system, automotive battery.
(12 Hrs)

Recommended Books:

Title	Author(s)	Publisher
Automobile Engineering	Nakra	Standard
Automobile Mechanics	Crouse	Tata McGraw-Hill
Automobile Engineering	Kirpal Singh	Standard
A Text Book of IC Engine	Mathur & Sharma	Dhanpat Rai