

BIJU PATNAIK UNIVERSITY OF TECHNOLOGY, ORISSA

COMPUTER SCIENCE & ENGINEERING (CSE)

5 th Semester				6 th Semester			
Theory		Contact Hours		Theory		Contact Hours	
Code	Subject	L-T-P	Credit	Code	Subject	L-T-P	Credit
HSSM3301	Principles of Management OR	3-0-0	3	HSSM3302	Optimization in Engineering OR	3-0-0	3
HSSM3302	Optimization in Engineering			HSSM3301	Principles of Management		
PCCS4301	Computer Organization	3-0-0	3	PCEL4303	Microprocessor & Microcontrollers	3-0-0	3
PCCS4302	Data Communication & Computer Network	3-0-0	3	PCCS4304	Operating System	3-0-0	3
PCIT4303	Java Programming	3-0-0	3	PCCS4305	Compiler Design	3-0-0	3
	Professional Elective-I (Any one)	3-0-0	3		Professional Elective-II (Any one)	3-0-0	3
PECS5301	Mobile Computing			PCIT4301	Internet & Web Technology		
PECS5302	Principles of Programming Languages			PECS5303	Pattern Recognition		
PECS5304	Theory of Computation			PCEC4304	Digital Signal Processing		
	Free Elective-I (Any one)	3-0-0	3		Free Elective-II (Any one)	3-0-0	3
PCBM4302	Signals & Systems			PCEC4305	Digital Communication Techniques		
PCEC4302	Analog Communication Techniques			PCEE4304	Communication Engineering		
PCEC4303	Control System Engineering			PEME5305	Robotics & Robot Applications		
				PEEE5301	Optoelectronics Devices & Instrumentation		
Theory Credits			18	Theory Credits			18
	Practical/Sessional				Practical/Sessional		
PCCS7301	Computer Organization Lab	0-0-3	2	PCEL7303	Microprocessor & Microcontroller Lab	0-0-3	2
PCCS7302	Computer Network Lab	0-0-3	2	PCCS7304	Operating System Lab	0-0-3	2
PCCS7303	JAVA Programming Lab	0-0-3	2	PCCS7307	Seminar	0-0-3	2
Practical/ Sessional Credits			6	Practical/ Sessional Credits			6
TOTAL SEMESTER CREDITS			24	TOTAL SEMESTER CREDITS			24
TOTAL CUMULATIVE CREDITS			134	TOTAL CUMULATIVE CREDITS			158

HSSM3301 **PRINCIPLES OF MANAGEMENT** (3-0-0)

Module I: Functions of Management

Concept of Management, Management as an Art or Science, The Process of Management, Managerial Skills, Good Managers are Born, not Made, Management is concerned with Ideas, Things and People, How a Manager Induces Workers to Put in Their Best, Levels and Types of Management, **Evolution of Management Thought**: Managerial Environment, The process of Management-Planning, Organizing, Directing, Staffing, Controlling.

Module II: Marketing Function of Management.

Modern Concept of Marketing, The Functional Classification of Marketing, Functions of a Marketing Management, Marketing Mix, Fundamental Needs of Customers, The Role of Distribution channels in Marketing, Advertising, Marketing, Consumerism and Environmentalism.

Module III: Financial Function & HRM Functions.

Financial Functions, Concept of Financial Management, Project Appraisal, Tools of Financial decisions making, Overview of Working Capital.

HRM Function of Management: Human Resource Management, Human Resource Development, Importance of HRM, Overview of Job Analysis, Job Description, Job Specification, Labour Turnover. Manpower Planning, Recruitment, Selection, Induction, Training and Development, Placement, Wage and Salary Administration, Performance Appraisal, Grievance Handling, Welfare Aspects.

Reference Books:

1. *Business Organization & Management*, CR Basu, TMH
2. *Business Organization & Management*, Tulsia, Pandey, Pearson
3. *Marketing Management*, Kotler, Keller, Koshi, Jha, Pearson
4. *Financial Management*, I.M. Pandey, Vikas
5. *Human Resource Management*, Aswasthapa, TMH.
6. *Modern Business Organisation & Management* by Sherlekar, Himalaya Publishing House.

HSSM3302 **OPTIMIZATION IN ENGINEERING** (3-0-0)

Module-I (10 Hours)

Idea of Engineering optimization problems, Classification of optimization algorithms, Modeling of problems and principle of modeling.

Linear programming: Formulation of LPP, Graphical solution, Simplex method, Big-M method, Revised simplex method, Duality theory and its application, Dual simplex method, Sensitivity analysis in linear programming

Module -II (10 Hours)

Transportation problems: Finding an initial basic feasible solution by Northwest Corner rule, Least Cost rule, Vogel's approximation method, Degeneracy, Optimality test, MODI method, Stepping stone method

Assignment problems: Hungarian method for solution of Assignment problems

Integer Programming: Branch and Bound algorithm for solution of integer Programming Problems

Queuing models: General characteristics, Markovian queuing model, M/M/1 model, Limited queue capacity, Multiple server, Finite sources, Queue discipline.

Module -III (10 Hours)

Non-linear programming: Introduction to non-linear programming.

Unconstrained optimization: Fibonacci and Golden Section Search method.

Constrained optimization with equality constraint: Lagrange multiplier, Projected gradient method

Constrained optimization with inequality constraint: Kuhn-Tucker condition, Quadratic programming

Introduction to Genetic Algorithm.

Recommended text books

1. A. Ravindran, D. T. Philips, J. Solberg, " *Operations Research- Principle and Practice*", Second edition, Wiley India Pvt Ltd
2. Kalyanmoy Deb, " *Optimization for Engineering Design*", PHI Learning Pvt Ltd

Recommended Reference books:

1. Stephen G. Nash, A. Sofer, " *Linear and Non-linear Programming*", McGraw Hill
2. A.Ravindran, K.M.Ragsdell, G.V.Reklaitis," *Engineering Optimization*", Second edition, Wiley India Pvt. Ltd
3. H.A.Taha,A.M.Natarajan, P.Balasubramanie, A.Tamilarasi, " *Operations Research*", Eighth Edition, Pearson Education
4. F.S.Hiller, G.J.Lieberman, " *Operations Research*", Eighth Edition, Tata McDraw Hill
5. P.K.Gupta, D.S.Hira, " *Operations Research*", S.Chand and Company Ltd.

PCCS4301 **COMPUTER ORGANIZATION** (3-0-0)

Module – I

12 Hrs

Basic structures of Computers: Functional units, operational concepts, Bus structures, Software, Performance, Computer Architecture vs Computer Organization.

Machine Instruction and Programs: Memory location and addresses, Big-endian and Little-endian representation. Memory Operations, Instructions and instruction Sequencing, Addressing modes, Assembly Language, Basic Input/output operations, subroutine, additional Instructions.

Module – II

12 Hrs

Arithmetic : Addition and subtraction of signed Numbers, Design of Fast Adders, Multiplication of positive Numbers, Signed-operand multiplication , Fast multiplication, Integer Division, Floating- point Numbers, (IEEE754 s...) and operations.

Module – III

12 Hrs

Basic Processing units: Fundamental concepts, execution of complete Instructions, Multi bus organization, Hardwired control, Micro programmed control, RISC vs CISC architecture.

Memory System: Basic Concepts, cache Memory, Cache memory mapping policies, Cache updating schemes, performance consideration, Virtual memories, Paging and Page replacement policies, Memory Management requirement, secondary storage.

Text Books:

1. Computer Organization: Carl Hamacher, Zvonkovranesic, Safwat Zaky, Mc Graw Hill, 5th Ed
2. Computer Organization and Design Hardware/ Software Interface: David A. Patterson, John L. Hennessy, Elsevier, 4th Edition.

Reference Book :

1. Computer Architecture and Organization: William Stallings, Pearson Education.
2. Computer Architecture and Organizations, Design principles and Application: B. Govinda Rajalu, Tata McGraw-Hill Publishing company Ltd.
3. Computer Architecture: Parhami, Oxford University Press
4. Computer system Architecture: Morris M. Mano PHI New Delhi.
5. Computer Architecture and Organization: John P. Hayes Mc Graw Hill introduction.
6. Structured Computer Organization: A.S. Tanenbum, PHI
7. Computer Architecture And Organization: An Integrated Approach, Murdocca, Hering Willey India, 1st Edition.

PCCS4302 **DATA COMMUNICATION & COMPUTER NETWORKS** (3-0-0)

Module – I

12 Hrs

Overview of Data Communications and Networking.

Physical Layer : Analog and Digital, Analog Signals, Digital Signals, Analog versus Digital, Data Rate Limits, Transmission Impairment, More about signals.

Digital Transmission: Line coding, Block coding, Sampling, Transmission mode.

Analog Transmission: Modulation of Digital Data; Telephone modems, modulation of Analog signals. Multiplexing : FDM , WDM , TDM ,

Transmission Media: Guided Media, Unguided media (wireless)

Circuit switching and Telephone Network: Circuit switching, Telephone network.

Module –II

12 Hrs

Data Link Layer

Error Detection and correction: Types of Errors, Detection, Error Correction

Data Link Control and Protocols:

Flow and Error Control, Stop-and-wait ARQ. Go-Back-N ARQ, Selective Repeat ARQ, HDLC.

Point-to –Point Access: PPP

Point –to- Point Protocol, PPP Stack,

Multiple Access

Random Access, Controlled Access, Channelization.

Local area Network: Ethernet.

Traditional Ethernet, Fast Ethernet, Gigabit Ethernet. Token bus, token ring

Wireless LANs: IEEE 802.11, Bluetooth virtual circuits: Frame Relay and ATM.

Module – III

12 Hrs

Network Layer:

Host to Host Delivery: Internetworking, addressing and Routing

Network Layer Protocols: ARP, IPV4, ICMP, IPV6 ad ICMPV6

Transport Layer: Process to Process Delivery: UDP; TCP congestion control and Quality of service.

Application Layer :

Client Server Model, Socket Interface, Domain Name System (DNS): Electronic Mail (SMTP) and file transfer (FTP) HTTP and WWW.

Text Books:

1. Data Communications and Networking: Behrouz A. Forouzan, Tata McGraw-Hill, 4th Ed
3. Computer Networks: A. S. Tannenbum, D. Wetherall, Prentice Hall, Imprint of Pearson 5th Ed

Reference Book :

1. Computer Networks:A system Approach:Larry L, Peterson and Bruce S. Davie,Elsevier, 4th Ed
2. Computer Networks: Natalia Olifer, Victor Olifer, Willey India
3. Data and Computer Communications: William Stallings, Prentice Hall, Imprint of Pearson, 9th Ed.
4. Data communication & Computer Networks: Gupta, Prentice Hall of India
5. Network for Computer Scientists & Engineers: Zheng, Oxford University Press
6. Data Communications and Networking: White, Cengage Learning

PCIT4303 **JAVA PROGRAMMING** (3-0-0)

Module – I

12 Hrs

Introduction to Java and Java programming Environment. Object Oriented Programming.

Fundamental Programming Structure: Data Types, variable, Typecasting Arrays, Operators and their precedence.

Control Flow: Java's Selection statements (if, switch, iteration, statement, while, do-while, for, Nested loop).

Concept of Objects and Classes, Using Existing Classes building your own classes, constructor overloading, static, final, this keyword.

Inheritance: Using Super to Call Super class constructor, Method overriding, Dynamic method Dispatch, Using Abstract Classes, Using final with inheritance. The Object Class.

Packages & Interfaces : Packages, Access Protection, Importing package, Interface, Implementing Interfaces, variables in Interfaces, Interfaces can be extended.

Exception Handling: Fundamentals, Types Checked, Unchecked exceptions, Using try & catch, Multiple catch, throw, throws, finally, Java's Built in exceptions, user defined exception.

Module - II

12 Hrs

Multi Threading: Java Thread Model, Thread Priorities, Synchronization, Creating a thread, Creating Multiple threads, Using isAlive () and join (), wait () & notify ().

String Handling: String constructors, String length, Character Extraction, String Comparison, Modifying a string.

Java I/O: Classes & Interfaces, Stream classes, Byte streams, Character streams, Serialization.

JDBC: Fundamentals, Type I, Type II, Type III, Type IV drivers.

Networking: Basics, Socket overview, Networking classes, & interfaces, TCP/IP client sockets, whois, URL format, URL connection, TCP/IP Server Sockets.

Module - III

12 Hrs

Applets: Basics, Architecture, Skeleton, The HTML APPLET Tag, Passing Parameters to Applets, Applet context and show documents ().

Event Handling: Delegation Event model, Event Classes, Event Listener Interfaces, Adapter classes.

AWT: AWT Classes window fundamentals, component, container, panel, Window, Frame, Canvas, Creating a frame window in an Applet, working with Graphics, Control Fundamentals, Layout managers, Handling Events by Extending AWT components.

Core java API package, reflection, Remote method Invocation (RMI)

Swing: J applet, Icons & Labels, Text fields, Buttons, Combo boxes, Tabbed panes, Scroll panes, Trees, Tables.

Exploring Java-lang: Simple type wrappers, Runtime memory management, object (using clone () and the cloneable Interface), Thread, Thread Group, Runnable.

Text Books:

1. Introduction to Java Programming: Liang, Pearson Education, 7th Edition.
2. Java The complete reference: Herbert Schildt, TMH, 5th Edition.

Reference Books:

1. Balguruswamy, Programming with JAVA, TMH.
2. Programming with Java: Bhave & Patekar, Pearson Education.
3. Big Java: Horstman, Willey India, 2nd Edition.
4. Java Programming Advanced Topics: Wigglesworth, Cengage Learning.
5. Java How to Program: H.M. Deitel & Paul J. Deitel, PHI, 8th Edition

PECS5301 **MOBILE COMPUTING** (3-0-0)

Module - I

10 Hrs

Introduction to Personal Communications Services (PCS) : PCS Architecture, mobility management, Networks signaling, Global System for Mobile Communication (GSM) System overview : GSM Architecture, Mobility management, Network signaling.

General Packet Radio Services (GPRS): GPRS Architecture, GPRS Network Nodes, Mobile Data Communication; WLANs (Wireless LANs) IEEE 802.11 standard, Mobile IP.

Module - II

14 Hrs

Wireless Application Protocol (WAP): The Mobile Internet standard, WAP Gateway and Protocols, wireless mark up Languages (WML), Wireless Local Loop (WLL) : Introduction to WLL Architecture, wireless Local Loop Technologies.

Third Generation (3G) Mobile Services: Introduction to International Mobile Telecommunications 2000 (IMT 2000) Vision, Wideband Code Division Multiple Access (W-CDMA), and CDMA 2000

Module - III

12 Hrs

Global Mobile Satellite Systems ; case studies of the IRIDIUM, ICO and GLOBALSTAR systems. Wireless Enterprise Networks : Introduction to Virtual Networks, Blue tooth technology, Blue tooth Protocols.

Server-side programming in Java, Pervasive web application architecture, Device independent example application.

Text Books:

1. Mobile Communication: J. Schiller, Pearson Education
2. Mobile Computing: P.K. Patra, S.K. Dash, Scitech Publications.
3. Mobile Computing: Talukder, TMH, 2nd Edition.

Reference Books:

1. Pervasive Computing: Burkhardt, Pearson Education.
2. Principles of Mobile Computing: Hansmann, Merk, Springer, 2nd Edition.
3. Wireless Communication & Networking: Garg, Elsevier
4. Third Generation Mobile Telecommunication Systems: P. Stavronlakis, Springer.
5. The Wireless Application Protocol: Sandeep Singhal, Pearson Education.

PECS5302 **PRINCIPLES OF PROGRAMMING LANGUAGES** (3-0-0)

Module – I

12 Hrs

Introduction: Overview of different programming paradigms e.g. imperative, object oriented, functional , logic and concurrent programming.

Syntax and semantics of programming languages: A quick overview of syntax specification and semiformal semantic specification using attribute grammar.

Imperative and OO Languages: Names, their scope, life and binding. Control-flow,Control abstraction; in subprogram and exception handling. Primitive and constructed data types, data abstraction, inheritance, type checking and polymorphism.

Module – II

12 Hrs

Functional Languages: Typed-calculus, higher order functions and types, evaluation strategies, type checking, implementation, case study.

Logic Programming Languages: Computing with relation, first-order logic, SLD-resolution, unification, sequencing of control, negation, implementation, case study.

Module – III

12 Hrs

Concurrency: Communication and synchronization, shared memory and message passing, safety and liveness properties, multithreaded program.

Formal Semantics : Operational, de-notational and axiomatic semantics of toy languages, languages with higher order constructs and types, recursive type, subtype, semantics of non determinism and concurrency.

Text Books:

1. Programming Languages: Principles and Paradigms: Tucker, Tata McGraw Hill, 5th Ed.
2. Programming Languages: Pratt, Pearson Education, 4th Edition

Reference Books:

1. Programming Language Concepts: C. Ghezzi, M. Jazayeri, Willey India, 3rd Edition.
2. Programming Languages: Principles & Practice: Louden, Cengage Learning, 2nd Edition.
3. Programming Languages: Concepts & Constructs: Sethi, Pearson education, 2nd Edition.
4. Programming Language Pragmatics: Scott, Elsevier, 3rd Edition.

PECS5304 **THEORY OF COMPUTATION** (3-0-0)

Module – I

10 Hrs

Alphabet, languages and grammars. Production rules and derivation of languages. Chomsky hierarchy of languages. Regular grammars, regular expressions and finite automata (deterministic and nondeterministic). Closure and decision properties of regular sets. Pumping lemma of regular sets. Minimization of finite automata. Left and right linear grammars.

Module – II

12 Hrs

Context free grammars and pushdown automata. Chomsky and Greibach normal forms. Parse trees, Cook, Younger, Kasami, and Early's parsing algorithms. Ambiguity and properties of context free languages. Pumping lemma, Ogden's lemma, Parikh's theorem. Deterministic pushdown automata, closure properties of deterministic context free languages.

Module – III

14 Hrs

Turing machines and variation of Turing machine model, Turing computability, Type 0 languages. Linear bounded automata and context sensitive languages. Primitive recursive functions. Cantor and Godel numbering. Ackermann's function, mu-recursive functions, recursiveness of Ackermann and Turing computable functions. Church Turing hypothesis. Recursive and recursively enumerable sets. Universal Turing machine and undecidable problems. Undecidability of Post correspondence problem. Valid and invalid computations of Turing machines and some undecidable properties of context free language problems. Time complexity class P, class NP, NP completeness.

Text Books:

1. Introduction to Automata Theory, Languages and Computation: J.E. Hopcroft and J.D Ullman, Pearson Education, 3rd Edition.
2. Introduction to the theory of computation: Michael Sipser, Cengage Learning
3. Theory of computation by Saradhi Varma, Scitech Publication

Reference Books:

1. Introduction to Languages and the Theory of Computation: Martin, Tata McGraw Hill, 3rd Edition
2. Introduction to Formal Languages, Automata Theory and Computation: K. Kirthivasan, Rama R, Pearson Education.
3. Theory of computer Science (Automata Language & computations) K.L. Mishra N. Chandrashekhar, PHI.
4. Elements of Theory of Computation: Lewis, PHI
5. Theory of Automata and Formal Languages: Anand Sharma, Laxmi Publication
6. Automata Theory: Nasir and Srimani, Cambridge University Press.
7. Introduction to Computer Theory: Daniel I.A. Cohen, Willey India, 2nd Edition.

PCBM4302 **SIGNALS & SYSTEMS** (3-0-0)

Module – I (10 hours)

Discrete-Time Signals and Systems:

Discrete-Time Signals: Some Elementary Discrete-Time signals, Classification of Discrete-Time Signals, Simple Manipulation; Discrete-Time Systems : Input-Output Description, Block Diagram Representation, Classification, Interconnection; Analysis of Discrete-Time LTI Systems: Techniques, Response of LTI Systems, Properties of Convolution, Causal LTI Systems, Stability of LTI Systems; Discrete-Time Systems Described by Difference Equations; Implementation of Discrete-Time Systems; Correlation of Discrete-Time Signals: Crosscorrelation and Autocorrelation Sequences, Properties.

Selected portions from Chapter 2 (2.1, 2.2, 2.3.1, 2.3.3, 2.3.4, 2.3.5, 2.3.6, 2.4, 2.5, 2.6.1, 2.6.2) of Textbook – I

Properties of Continuous-Time Systems:

Block Diagram and System Terminology, System Properties: Homogeneity, Time Invariance, Additivity, Linearity and Superposition, Stability, Causality.

Selected portions from Chapter 4 (4.2, 4.4) of Textbook – II

Module – II (12 hours)

The Continuous-Time Fourier Series:

Basic Concepts and Development of the Fourier Series, Calculation of the Fourier Series, Properties of the Fourier Series.

Selected portions from Chapter 8 (8.3, 8.4, 8.7) of Textbook – II

The Continuous-Time Fourier Transform:

Basic Concepts and Development of the Fourier Transform, Properties of the Continuous-Time Fourier Transform.

Selected portions from Chapter 10 (10.3, 10.6) of Textbook – II

Module- III (13 hours)

The Z-Transform and Its Application to the Analysis of LTI Systems:

The Z-Transform: The Direct Z-Transform, The Inverse Z-Transform; Properties of the Z-Transform; Rational Z-Transforms: Poles and Zeros, Pole Location and Time-Domain Behavior for Causal Signals, The System Function of a Linear Time-Invariant System; Inversion of the Z-Transforms: The Inversion of the Z-Transform by Power Series Expansion, The Inversion of the Z-Transform by Partial-Fraction Expansion; The One-sided Z-Transform: Definition and Properties, Solution of Difference Equations.

Selected portions from Chapter 3 (3.1, 3.2, 3.3, 3.4.2, 3.4.3, 3.6.1, 3.6.2) of Textbook– I

The Discrete Fourier Transform: Its Properties and Applications:

Frequency Domain Sampling: The Discrete Fourier Transform; Properties of the DFT: Periodicity, Linearity, and Symmetry Properties, Multiplication of Two DFTs and Circular Convolution, Additional DFT Properties.

Selected portion from Chapter – 7 (7.1.2, 7.2.1, 7.2.2, 7.2.3) of Textbook – 1.

Text Books:

1. *Digital Signal Processing – Principles, Algorithms and Applications* by J. G. Proakis and D. G. Manolakis, 4th Edition, Pearson.
2. *Fundamentals of Signals and Systems* - M. J. Roberts, TMH

Reference Book:

1. Signals and Systems - P. R. Rao, TMH.
2. Signals and Systems – A Nagoor Kani, TMH
3. Signals and Systems by Chi-Tsong Chen, Oxford
4. Principles of Signal Processing and Linear Systems, by B.P. Lathi, Oxford.
5. Principles of Linear Systems and Signals, by B.p. Lathi, Oxford

PCEC4302 **ANALOG COMMUNICATION TECHNIQUES** (3-0-0)

Module-I : (12 Hours)

SIGNALS AND SPECTRA:An Overview of Electronic Communication Systems, Signal and its Properties, Fourier Series Expansion and its Use, The Fourier Transform, Orthogonal Representation of Signal.

RANDOM VARIABLES AND PROCESSES: Probability, Random variables, Useful Probability Density functions, Useful Properties and Certain Application Issues.

AMPLITUDE MODULATION SYSTEMS: Need for Frequency translation, Amplitude Modulation(*Double Side Band with Carrier DSB-C*),Single Sideband Modulation(SSB) Other AM Techniques and Frequency Division Multiplexing ,Radio Transmitter and Receiver.

Module-II : (12 Hours)

ANGLE MODULATION: Angle Modulation, Tone Modulated FM Signal, Arbitrary Modulated FM signal, FM Modulators and Demodulators, Approximately Compatible SSB Systems.

PULSE MODULATION AND DIGITAL TRANSMISSION OF ANALOG SIGNAL: Analog to Digital(*Noisy Channel and Role of Repeater*), Pulse Amplitude Modulation and Concept of Time division multiplexing ,Pulse Width Modulation and Pulse Position Modulation, Digital Representation of Analog Signal.

Module-III : (14 Hours)

MATHEMATICAL REPRESENTATION OF NOISE:Some Sources of Noise, Frequency-domain Representation of Noise ,Superposition of Noises, Linear Filtering of Noise.

NOISE IN AMPLITUDE MODULATION SYSTEM : Framework for Amplitude Demodulation, Single Sideband Suppressed Carrier(SSB-SC), Double Sideband Suppressed Carrier(DSB-SC), Double Sideband With Carrier(DSB-C).

NOISE IN FREQUENCY MODULATION SYSTEM : An FM Receiving System, Calculation of Signal to Noise Ratio, Comparison of FM and AM, Preemphasis and Deemphasis and SNR Improvement, Noise in Phase Modulation and Multiplexing Issues, Threshold in Frequency Modulation, Calculation of Threshold in an FM Discriminator, The FM Demodulator using Feedback(FMFB).

Text Book:

1. H. Taub, D. L Schilling, G. Saha; *Principles of Communication System, 3rd Edition; 2008, Tata McGraw Hill, India; ISBN: 0070648115. (Selected portions from chapters: Chapter-1,Chapter-2, Chapter-3, Chapter-4, Chapter-5, Chapter-7, Chapter-8, Chapter-9)*

Supplementary Reading:

1. Communication System Engineering,Second Edition by Masoud Salehi, John G. Proakis, ISBN: 0130950076 (paperback)
2. Analog Communication by Chandra Sekar, Oxford University Press.
3. Modern Digital and Analog Communication Systems, by B.P. Lathi, Oxford

PCEC4303 **CONTROL SYSTEM ENGINEERING** (3-0-0)

Module-I :

(12 Hours)

Introduction to Control Systems : Basic Concepts of Control Systems, Open loop and closed loop systems, Servo Mechanism/Tracking System, Regulators, Mathematical Models of Physical Systems: Differential Equations of Physical Systems: Mechanical Translational Systems, Mechanical Accelerations, Rotational systems, Gear Trains, Electrical Systems, Analogy between Mechanical and electrical quantities, Thermal systems, fluid systems, Derivation of Transfer functions, Block Diagram Algebra, Signal flow Graphs, Mason's Gain Formula. Feedback characteristics of Control Systems: Effect of negative feedback on sensitivity, bandwidth, Disturbance, linearizing effect of feedback, Regenerative feedback.

Control Components : D.C. Servomotors, A.C. Servomotors, A.C. Tachometer, Synchros, Stepper Motors.

Module-II :

(15 Hours)

Time response Analysis : Standard Test Signals : Time response of first order systems to unit step and unit ramp inputs. Time Response of Second order systems to unit step input, Time Response specifications, Steady State Errors and Static Error Constants of different types of systems. Generalised error series and Generalised error coefficients, Stability and Algebraic Criteria, concept of stability, Necessary conditions of stability, Hurwitz stability criterion, Routh stability criterion, Application of the Routh stability criterion to linear feedback system, Relative stability by shifting the origin in s-plane.

Root locus Technique: Root locus concepts, Rules of Construction of Root locus, Determination of Roots from Root locus for a specified open loop gain, Root contours, Systems with transportation lag. Effect of adding open loop poles and zeros on Root locus.

Module-III :

(13 Hours)

Frequency Response Analysis : Frequency domain specifications, correlation between Time and Frequency Response with respect to second order system, Polar plots, Bode plot. Determination of Gain Margin and Phase Margin from Bode plot.

Stability in frequency domain : Principle of argument, Nyquist stability criterion, Application of Nyquist stability criterion for linear feedback system.

Closed loop frequency response : Constant M-circles, Constant N-Circles, Nichol's chart.

Controllers : Concept of Proportional, Derivative and Integral Control actions, P, PD, PI, PID controllers. Zeigler-Nichols method of tuning PID controllers.

Text Books :

1. Modern Control Engineering by K. Ogata, 5th edition PHI.
2. Control Systems Engg. by I.J. Nagrath and M.Gopal, 5th Edition, New Age International Publishers (2010).
3. Modern Control Systems by Richard C.Dorf and Robert H. Bishop, 11th Ed (2009), Pearson

Reference Books :

1. Design of Feedback Control Systems by R.T. Stefani, B. Shahian, C.J. Savator, G.H. Hostetter, Fourth Edition (2009), Oxford University Press.
2. Control Systems (Principles and Design) by M.Gopal 3rd edition (2008), TMH.
3. Analysis of Linear Control Systems by R.L. Narasimham, I.K. International Publications
4. Control Systems Engineering by S.P. Eugene Xavier and J. Josheph Cyril Babu, 1st Edition (2004), S. Chand Co. Ltd.
5. Problems and solutions in Control System Engineering by S.N. Sivanandam and S.N. Deepa, Jaico Publishing House.

PCCS7301 COMPUTER ORGANIZATION LAB (0-0-3)
(Common to IT)

1. To recognize various components of PC.
2. Dismantling and assembling a PC.
3. Some experiments using Hardware trainer kits for SMPS, CPU , Hard disk , Motherboard, printer, real time clock etc.
4. Simulation of simple fundamental units like half adder, full adder, multiplexer, de-multiplexer, Arithmetic logic Unit, Simple processor (CPU) etc using VHDL code.

PCCS7302 COMPUTER NETWORK LAB (0-0-3)
(Common to IT)

1. Some Network protocol simulation using NetSim, NS2, etc. for
 - i) Analysing number of transmitting nodes vs. collision count, mean delay for Ethernet LAN .
 - ii) Analysing bus vs. star-switch with respect to number of collisions (for a fixed number of transmitting nodes) for Ethernet LAN
 - iii) Analysing performance of token ring with number of nodes vs. response time, mean delay using NetSim.
 - iv) Comparing the throughput and normalized throughput for token ring and token bus for different transmitting nodes.
 - v) Comparing the CSMA/CD vs. CSMA/CA protocols (for a fixed number of transmitting nodes).
 - vi) Analysing the difference between unicast and broadcast transmission (for a fixed number of transmitting nodes).
 - vii) Verification of stop-and-wait protocol.
 - viii) Verification of Go-back-N protocol.
 - ix) Verification of Selective repeat protocol.
 - x) Verification of distance vector routing algorithm.
 - xi) Verification of link state routing algorithm.
2. Some programming techniques in socket programming.

PCCS7303 JAVA Programming Lab (0-0-3)
(Common to IT)

To do various JAVA programs on:

- i) Introduction, Compiling & executing a java program.
- ii) data types & variables, decision control structures: if, nested if etc.
- iii) loop control structures: do, while, for etc.
- iv) classes and objects.
- v) data abstraction & data hiding, inheritance, polymorphism.
- vi) threads, exception handlings and applet programs
- vii) interfaces and inner classes, wrapper classes, generics

PCEL4303 MICROPROCESSOR & MICRO CONTROLLERS

MODULE - I (10 hours)

Microprocessor Architecture: Microprocessor and Microcomputer Architecture, Pins & Signals, Register Organization, Timing & Control Module, 8085 Instruction Timing & Execution.

Assembly Language Programming of 8085: Instruction set of 8085, Memory & I/O Addressing, Assembly language programming, Stack & Subroutines.

Interfacing EPROM & RAM Memories: 2764 & 6264, 8085 Interrupts

(Book 1: Ch.1,2,3,4 & 7)

MODULE – II (15 hours)

8086 Microprocessor: Architectures, Pin Diagrams and Timing Diagrams: Register Organisation, Architecture, Signal Description, Physical Memory Organisations, Bus Operation, I/O Addressing Capability, Special Processor Activities, Minimum Mode System and Timings, Maximum Mode System and Timings

8086 Instruction Set and Assembler Directives: Machine Language Instruction Formats, Addressing Modes, Instruction Set, Assembler Directives and Operators

Assembly Language Programming with 8086: Machine Level Programs, Machine Coding the Programs, Programming with an Assembler

Special Architectural Features and Related Programming: Stack, Interrupts and Interrupt Service Routines, Interrupt Cycle, Non Maskable Interrupt, Maskable Interrupt, Interrupt Programming, Passing Parameters to Procedures, Handling Programs of Size More than 64k, MACROS, Timings and Delays

Basic Peripherals and Their Interfacing with 8086: Semiconductor Memory Interfacing, Dynamic RAM Interfacing, Interfacing I/O Ports, PIO 8255], Modes of Operation of 8255, Interfacing Analog to Digital Data Converters, Interfacing Digital to Analog to Converters, Stepper Motor Interfacing,

Special Purpose Programmable Peripheral Devices and Their Interfacing
Programmable Interval Timer 8253, Programmable Interrupt Controller 8259A, The Keyboard/Display Controller 8279, Programmable Communication Interface 8251USART

DMA, Floppy Disk and CRT Controllers

DMA Controller 8257, DMA Transfers and Operations, Programmable DMA Interface 8237, Floppy Disk Controller 8272, CRT Controller 8275

80386 Microprocessor: Introduction, Architecture, Pins & Signals, Memory System, Registers, Memory Management, Paging Technique, Protected Mode Operation.

(Book-2: Ch.1.1 to 1.9, ch.2.1 to 2.4, ch.3.1 to 3.3, ch.4.1 to 4.10, ch.5.1 to 5.8, ch.6.1 to 6.4, ch.7.1 to 7.5, ch.10.1 to 10.3, 10.7, 10.9)

MODULE –III (15 HOURS)

8051 Microcontrollers: Microcontrollers and embedded processors, Overview of the 8051 family

8051 Hardware Connection: Pin description of the 8051

8051 Assembly Language Programming: Inside the 8051, Assembly, Programming

Assembling and Running an 8051 Program, The Program Counter and ROM Space in the 8051

8051 data types and Directives, PSW Register, register Banks and Stack

Jump, loop, and Call Instructions: Loop and Jump Instructions, Call Instructions, Time Delay for Various 8051 chips

8051 I/O Port Programming: I/O Programming, I/O Bit Manipulation Programming,
8051 Addressing Modes: Immediate and register Addressing Modes, Accessing memory using various Addressing Modes, Bit Addresses for I/O and RAM

Arithmetic & Logic Instructions and Programs: Arithmetic Instructions, Signed number concepts and Arithmetic Operations, Logic and Compare Instructions, Rotate Instruction and data Serialization, BCD, ASCII, and other Application Programs

8051 Serial Port Programming in Assembly: Basic of Serial communication, 8051 connection to RS232, 8051 Serial port Programming in Assembly, Programming the second Serial port

Interrupts Programming in Assembly: 8051 Interrupts, Programming timer Interrupts, Programming external hardware Interrupts, Programming the Serial Communication interrupt, Interrupt Priority in the 8051

ADC, DAC, and Sensor Interfacing: Parallel and Serial ADC, DAC Interfacing Sensor Interfacing and Signal Conditioning

Interfacing to External Memory: Semiconductor Memory, Memory Address Decoding, Interfacing with External ROM, 8051 Data Memory space, Accessing External data Memory

8051 Interfacing with the 8255: 8255 Interfacing, Programming for the 8255

Motor Control: RELAY, PWM, DC, and Stepper Motors: Relays and Opto-isolations, Stepper Motor Interfacing, DC Motor Interfacing and PWM

(Book-3: Ch.1.1,1.2,ch.2.1 to 2.7,ch.3.1 to 3.3,ch.4.1,4.2,ch.5.1 to 5.3,ch.6.1 to 6.5,ch.10.1 to 10.4,ch.11.1 to 11.5,ch.13.1 to 13.3,ch.14.1 to 14.4,ch.15.1,15.2,ch.17.1 to 17.3)

TEXT BOOKS

1. Ghosh & Sridhar,0000 to 8085–Introduction to Microprocessor for Scientists & Engineers, PHI
2. A.K. Roy & K.M. Bhurchandi, Advanced Microprocessor and Peripherals (Architecture, Programming & Interfacing)– TMH Publication
3. Mazidi & Mazidi, The 8051 Microcontroller & Embedded Systems– Pearson / PHI publication

. REFERENCE:

1. M. Rafiqzaman, Microprocessor – Theory & Applications. (Intel & Motorola), PHI
- 2.The 8086 Microprocessor: Programming & Interfacing the PC by Keneeth J. Ayela
3. Douglas V.Hall, “Microprocessors and Interfacing: Programming and Hardware”, TMH
4. R.S. Gaonkar, Microprocessor architecture, programming & application with 8085, Penram International Publishing. (India) Pvt. Ltd.
- 5.W.A.Triebel and Avtar Singh, The 8088 and 8086 Microprocessors, Pearson Education
6. Barry B. B The Intel Microprocessor – (Architecture, Programming & Interfacing) by Pearson

PCCS4304 **OPERATING SYSTEM** (3-0-0)

MODULE-I

12 Hours

INTRODUCTION TO OPERATING SYSTEM:

What is an Operating System? Simple Batch Systems, Multiprogramming and Time Sharing systems. Personal Computer Systems, Parallel Systems, Distributed Systems and Real time Systems.

Operating System Structures: Operating System Services, System components, Protection system, Operating System Services, system calls

PROCESS MANAGEMENT:

Process Concept, Process Scheduling, Operation on Processes, Interprocess communication, Examples of IPC Systems, Multithreading Models, Threading Issues, Process Scheduling Basic concepts, scheduling criteria, scheduling algorithms, Thread Scheduling.

MODULE-II

12 Hours

PROCESS COORDINATION: Synchronization: The Critical section problem, Peterson's solution, Synchronization hardware, Semaphores, Classical problems of synchronization, Monitors.

Deadlocks: System model, Deadlock Characterization Methods for Handling Deadlocks, Deadlock Prevention, Deadlock avoidance, Deadlock Detection, recovery from Deadlock.

MEMORY MANAGEMENT: Memory Management strategies, Logical versus Physical Address space, swapping, contiguous Allocation, Paging, Segmentation.

Virtual Memory: Background, Demand paging, performance of Demand paging, Page Replacement, Page Replacement Algorithms. Allocation of frames, Thrashing, Demand Segmentation.

MODULE-III

11 Hours

STORAGE MANAGEMENT:

File System Concept, Access Methods, File System Structure, File System Structure, File System Implementation, Directory implementation, Efficiency and Performance, Recovery, Overview of Mass Storage Structure, Disk Structure, Disk Scheduling, Disk Management, Swap-Space Management, I/O System Overview, I/O Hardware, Application I/O Interface, Kernel I/O Subsystem, Transforming I/O Request to Hardware Operation.

CASE STUDIES: The LINUX System, Windows XP, Windows Vista

TEXT BOOK:

1. **Operating System Concepts** – Abraham Silberschatz, Peter Baer Galvin, Greg Gagne, 8th edition, Wiley-India, 2009.
2. **Mordern Operating Systems** – Andrew S. Tanenbaum, 3rd Edition, PHI
3. **Operating Systems: A Spiral Approach** – Elmasri, Carrick, Levine, TMH Edition

REFERENCE BOOK:

1. **Operating Systems** – Flynn, McHoes, Cengage Learning
2. **Operating Systems** – Pabitra Pal Choudhury, PHI
3. **Operating Systems** – William Stallings, Prentice Hall
4. **Operating Systems** – H.M. Deitel, P. J. Deitel, D. R. Choffnes, 3rd Edition, Pearson

Compiler Design (3-0-0)

MODULE – 1 (Lecture hours: 13)

Introduction: Overview and phases of compilation. (2-hours)

Lexical Analysis: Non-deterministic and deterministic finite automata (NFA & DFA), regular grammar, regular expressions and regular languages, design of a lexical analyser as a DFA, lexical analyser generator. (3-hours)

Syntax Analysis: Role of a parser, context free grammars and context free languages, parse trees and derivations, ambiguous grammar.

Top Down Parsing: Recursive descent parsing, LL(1) grammars, non-recursive predictive parsing, error reporting and recovery.

Bottom Up Parsing: Handle pruning and shift reduces parsing, SLR parsers and construction or SLR parsing tables, LR(1) parsers and construction of LR(1) parsing tables, LALR parsers and construction of efficient LALR parsing tables, parsing using ambiguous grammars, error reporting and recovery, parser generator.

(8-hours)

MODULE – 2 (Lecture hours: 14)

Syntax Directed Translation: Syntax directed definitions (SDD), inherited and synthesized attributes, dependency graphs, evaluation orders for SDD, semantic rules, application of syntax directed translation.

(5-hours)

Symbol Table: Structure and features of symbol tables, symbol attributes and scopes.

(2-hours)

Intermediate Code Generation: DAG for expressions, three address codes - quadruples and triples, types and declarations, translation of expressions, array references, type checking and conversions, translation of Boolean expressions and control flow statements, back patching, intermediate code generation for procedures.

(7-hours)

MODULE – 3 (Lecture hours: 8)

Run Time Environment: storage organizations, static and dynamic storage allocations, stack allocation, handlings of activation records for calling sequences.

(3-hours)

Code Generations: Factors involved, registers allocation, simple code generation using stack allocation, basic blocks and flow graphs, simple code generation using flow graphs.

(3-hours)

Elements of Code Optimization: Objective, peephole optimization, concepts of elimination of local common sub-expressions, redundant and un-reachable codes, basics of flow of control optimization.

(2-hours)

Text Book:

Compilers – Principles, Techniques and Tools

Authors: Alfred V. Aho, Monica S. Lam, Ravi Sethi and Jeffrey D. Ullman

Publisher: Pearson

PCIT4301 **INTERNET AND WEB TECHNOLOGY** (3-0-0)

Module –I (Lecture Hour 12)

The Internet and WWW

Understanding the WWW and the Internet, Emergence of Web, Web Servers, Web Browsers, Protocols, Building Web Sites

HTML

Planning for designing Web pages, Model and structure for a Website, Developing Websites, Basic HTML using images links, Lists, Tables and Forms, Frames for designing a good interactive website

Module –II (Lecture Hour 12)

JAVA Script

Programming Fundamentals, Statements, Expressions, Operators, Popup Boxes, Control Statements, Try.... Catch Statement, Throw Statement, Objects of Javascript: Date object, array object, Boolean object, math object

CSS

External Style Sheets, Internal Style Sheets, Inline Style, The class selector, div & span tag

DOM

HTML DOM, inner HTML, Dynamic HTML (DHTML), DHTML form, XML DOM

Module –III (Lecture Hour 11)

CGI/PERL

Introduction to CGI, Testing & Debugging Perl CGI Script, Using Scalar variables and operators in Perl

Java Applet

Introduction to Java, Writing Java Applets, Life cycle of applet

Textbooks

1. Web Warrior Guide to Web Design Technologies, Don Gosselin, Joel Sklar & others, Cengage Learning

Reference Books

1. Web Programming: Building Internet Applications, Chris Bates, Wiley Dreamtech
2. Programming the World Wide Web, Robert W Sebesta, Pearson
3. Web Technologies, Uttam K Roy, Oxford
4. Web Technology: A developer perspective, Gopalan & Akilandeswari, PHI

PECS5303 **PATTERN RECOGNITION** (3-0-0)

Module –I (Lecture Hour 12)

Introduction

Features, Feature Vectors and Classifiers, Supervised vs. unsupervised pattern

Classifier

Classifier based on Bayes Decision Theory, Linear classifier: Least square methods, Mean square estimation, Support vector machines, nonlinear classifier: Two layer & three layer perceptron, Back propagation algorithm, combining classifiers

Module –II (Lecture Hour 12)

Feature Selection

Preprocessing, Statistical hypothesis testing, Class separability measures

Feature Generation

Linear transforms, Discrete Fourier transform (DFT), Hadamard transform, Discrete Time Wavelet transform (DTWT)

Fourier feature, Moment-based features

Fractals: Self similarity, Fractional Brownian Motion (FBM), Fractal dimension

Module –III (Lecture Hour 11)

Template Matching

Based on optimal path searching techniques, correlations

Clustering

Sequential algorithms: Estimation of number of clusters

Hierarchical algorithms: Agglomerative algorithms

Textbooks

1. Pattern Recognition, Sergios Theodoridis & Konstantinos Koutroumbas, Elsevier

PCEC4304 **DIGITAL SIGNAL PROCESSING** (3-0-0)

Module – I

(10 hours)

The Z-Transform and Its Application to the Analysis of LTI Systems:

The Z-Transform: The Direct Z-Transform, The Inverse Z-Transform; Properties of the Z-Transform; Inversion of the Z-Transforms: The Inversion of the Z-Transform by Power Series Expansion, The Inversion of the Z-Transform by Partial-Fraction Expansion; Analysis of Linear Time-Invariant Systems in the z-Domain: Response of Systems with rational System Functions, Transient and Steady-State Responses, Causality and Stability, Pole-Zero Cancellations.

Selected portions from Chapter 3 (3.1.1, 3.1.2, 3.2, 3.4.2, 3.4.3, 3.5.1, 3.5.2, 3.5.3, 3.5.4) of Textbook – I

The Discrete Fourier Transform: Its Properties and Applications

Frequency Domain Sampling: Frequency-Domain Sampling and Reconstruction of Discrete-Time Signals, The Discrete Fourier Transform, The DFT as a Linear Transformation, Relationship of the DFT to other Transforms; Properties of the DFT: Periodicity, Linearity, and Symmetry Properties, Multiplication of Two DFTs and Circular Convolution, Additional DFT Properties; Linear Filtering Methods Based on the DFT: Use of the DFT in Linear Filtering, Filtering of Long Data Sequences; Frequency Analysis of Signals using the DFT; The Discrete Cosine Transform: Forward DCT, Inverse DCT, DCT as an Orthogonal Transform.

Chapter – 7 of Textbook – 1.

Module – II

(10 hours)

Implementation of Discrete-Time Systems:

Structure for the Realization of Discrete-Time Systems, Structure for FIR Systems: Direct-Form Structure, Cascade-Form Structures, Frequency-Sampling Structures; Structure for IIR Systems: Direct-Form Structures, Signal Flow Graphs and Transposed Structures, Cascade-Form Structures, Parallel-Form Structures.

Selected portions from Chapter 9 (9.1, 9.2.1, 9.2.2, 9.2.3, 9.3.1, 9.3.2, 9.3.3, 9.3.4) of Textbook – I

Design of Digital Filters:

General Considerations: Causality and Its Implications, Characteristics of Practical Frequency-Selective Filters; Design of FIR Filters: Symmetric and Antisymmetric FIR Filters, Design of Linear-Phase FIR Filters by using Windows, Design of Linear-Phase FIR Filters by the Frequency-Sampling Method; Design of IIR Filters from Analog Filters: IIR Filter Design by Impulse Invariance, IIR Filter Design by the Bilinear Transformation.

Selected portions from Chapter 10 (10.1.1, 10.1.2, 10.2.1, 10.2.2, 10.2.3, 10.2.4, 10.3.2, 10.3.3) of Textbook – I

Module- III

(15 hours)

Efficient Computation of the DFT: Fast Fourier Transform Algorithms

Efficient Computation of the DFT: FFT Algorithms: Direct Computation of the DFT, Radix-2 FFT Algorithms: Decimation-In-Time (DIT), Decimation-In-Time (DIF); Applications of FFT Algorithms: Efficient Computation of the DFT of two Real Sequences, Efficient Computation of the DFT a 2N-Point Real Sequence, Use of the FFT Algorithm in Linear Filtering and Correlation.

Selected portions from Chapter 8 (8.1.1, 8.1.3, 8.2.1, 8.2.2, 8.2.3) of Textbook – I

Adaptive Filters:

Application of Adaptive Filters: System Identification or System Modeling, Adaptive Channel Equalization, Adaptive Line Enhancer, Adaptive Noise Cancelling; Adaptive

Direct-Form FIR Filters-The LMS Algorithm: Minimum Mean Square Error Criterion, The LMS Algorithm.

Selected portions from chapter 13 (13.1.1, 13.1.2, 13.1.5, 13.1.6, 13.2.1, 13.2.2) of Text book –I

Text Books

1. Digital Signal Processing – Principles, Algorithms and Applications by J. G. Proakis and D. G. Manolakis, 4th Edition, Pearson.

Reference Book :

1. Digital Signal Processing: a Computer-Based Approach – Sanjit K. Mitra, TMH
2. Digital Signal Processing – S. Salivahan, A. Vallavraj and C. Gnanapriya, TMH.
3. Digital Signal Processing – Manson H. Hayes (Schaum's Outlines) Adapted by Subrata Bhattacharya, TMH.
4. Digital Signal Processing: A Modern Introduction – Ashok Ambardar, Cengage Learning.
5. Modern Digital Signal Processing – Roberto Cristi, Cengage Learning.
6. Digital Signal Processing: Fundamentals and Applications – Li Tan, Academic Press, Elsevier.
7. Digital Signal Processing: A MATLAB-Based Approach – Vinay K. Ingle and John G. Proakis, Cengage Learning.
8. Fundamentals of Digital Signal Processing using MATLAB – Robert J. Schilling and Sandra L. Harris, Cengage Learning.

PCEC4305 DIGITAL COMMUNICATION TECHNIQUES (3-0-0)

MODULE-I. 12 Hrs

Digital Modulation Schemes:Representation of Digitally Modulated Signals, Memoryless Modulation Methods, Signaling Schemes with Memory, Power Spectrum of Digitally Modulated Signals

Optimum Receivers for AWGN Channels: Waveform and Vector Channel Models, Waveform and Vector AWGN Channels, Optimal Detection and Error Probability for Band-Limited Signaling, Optimal Detection and Error Probability for Power-Limited Signaling, A Comparison of Digital Signaling Methods, Detection of Signaling Schemes with Memory, Optimum receiver for CPM Signals

MODULE-II 12 Hrs

Introduction to Information Theory: Mathematical model for information sources, Logarithmic measure of information, lossless coding for information sources, channel model and channel capacity, Channel reliability function, channel cutoff rate.

Digital Communication through Band-Limited Channels: Characterization of Band-Limited Channels, Signal design for Band-Limited Channels, Optimum Receiver for Channels with ISI and AWGN, Linear Equalization, Decision-feedback Equalization.

MODULE-III 12 Hrs

Spread Spectrum Signal for Digital Communication: Models of spread spectrum communication, Direct sequence spread spectrum signals, frequency hopping spread spectrum signals, other types of spread spectrum signals, synchronization of spread spectrum system.

Text Book:

1. John G.Proakis, M. Salehi, "Digital Communications",5th Edition 2008, McGraw Hill, 2008.(Selected portion form Chapter 3,4, 6, 9 and 12.)

Reference Book:

1. B. Sklar and P K Ray; Digital Communications – Fundamentals and Applications; Pearson Education; 2009

PCEI4304 **COMMUNICATION ENGINEERING** (3-0-0)

MODUE-I

INTRODUCTION: Elements of an Electrical Communication System, Communication Channels and their Characteristics, Mathematical Models for Communication Channels

FREQUENCY DOMAIN ANALYSIS OF SIGNALS AND SYSTEMS: Fourier series, Fourier Transforms, Power and Energy, Sampling and Band limited signals, Band pass signals

MODULE-II

ANALOG SIGNAL TRANSMISSION AND RECEPTION: Introduction to modulation, Amplitude Modulation (AM), Angle Modulation, Radio and Television broadcasting

MODULE-III

PULSE MODULATION SYSTEMS: Pulse amplitude modulation, Pulse Time Modulation

PULSE CODE MODULATION: PCM system, Intersymbol interference, Eye patterns, Equalization, Companding, Time Division Multiplexing of PCM signals, Line codes, Bandwidth of PCM system, Noise in PCM systems, Delta Modulation (DM), Limitations of DM, Adaptive Delta Modulation, Noise in Delta Modulation, Comparison between PCM and DM, Delta or Differential PCM (DPCM), S-Ary System

Text Book:

1. John G.Proakis,M. Salehi, *COMMUNICATION SYSTEMS ENGINEERING*, 2nd ed. New Delhi,India: PHI Learning Private Limited, 2009.; Selected portion from Chapter 1,2 and 3 for module MODULE-I and MODULE-II of the course.
2. R.P Singh and S.D Sapre, *COMMUNICATION SYSTEMS Analog & Digital*, 2nd ed. New Delhi, India: Tata McGraw Hill Education Private Limited, 2009; Selected portions from Chapter 7 and 8 of the book for MODULE-III.

Reference Book:

1. Taub, Schilling, Saha, Taub's Principles of Communication Systems, TMH.
2. Modern Digital and Analog Communication Systems, by B.P. Lathi, Oxford

PEME5305 **ROBOTICS & ROBOT APPLICATIONS** (3-0-0)

Module – I

1. Fundamentals of Robotics: Evolution of robots and robotics, Definition of industrial robot, Laws of Robotics, Classification, Robot Anatomy, Work volume and work envelope, Human arm characteristics, Design and control issues, Manipulation and control, Resolution; accuracy and repeatability, Robot configuration, Economic and social issues, Present and future application.
2. Mathematical modeling of a robot: Mapping between frames, Description of objects in space, Transformation of vectors.
Direct Kinematic model: Mechanical Structure and notations, Description of links and joints, Kinematic modeling of the manipulator, Denavit-Hartenberg Notation, Kinematic relationship between adjacent links, Manipulator Transformation matrix.

Module – II

3. Inverse Kinematics: Manipulator workspace, Solvable of inverse kinematic model, Manipulator Jacobian, Jacobian inverse, Jacobian singularity, Static analysis.
4. Dynamic modeling: Lagrangian mechanics, 2D- Dynamic model, Lagrange-Euler formulation, Newton-Euler formulation.
5. Robot Sensors: Internal and external sensors, force sensors, Thermocouples, Performance characteristic of a robot.

Module – III

6. Robot Actuators: Hydraulic and pneumatic actuators, Electrical actuators, Brushless permanent magnet DC motor, Servomotor, Stepper motor, Micro actuator, Micro gripper, Micro motor, Drive selection.
7. Trajectory Planning: Definition and planning tasks, Joint space planning, Cartesian space planning.
8. Applications of Robotics: Capabilities of robots, Material handling, Machine loading and unloading, Robot assembly, Inspection, Welding, Obstacle avoidance.

Text Books:

1. Robotics and Control, R.K. Mittal and I.J. Nagrath, Tata McGraw Hill
2. Introduction to Robotics: Mechanics and control, John J Craig, PHI
3. Robotics Technology and Flexible Automation, S.R.Deb and S. Deb, TMH.

Reference Books:

1. Introduction to Robotics, S. K. Saha, Tata McGraw Hill
2. Robotics: Control, Sensing, Vision and Intelligence, K.S.Fu, R.C.Gonzalez and C.S.G.Lee, McGraw Hill
3. Robotics, Appuu Kuttan K.K., I.K. international
4. Robot Dynamics and Control, M.W.Spong and M. Vidyasagar , Wiley India.
5. Industrial Robotics Technology, programming and application, M.P.Groover, TMH.
6. Introduction to Robotics: Analysis, Systems, Applications, S.B.Niku, PHI
7. Robotics: Fundamental Concepts and Analysis, A. Ghosal, Oxford University Press
8. Fundamentals of Robotics: Analysis and Control, R. J. Schilling, PHI
9. Robotic Engineering: An Integrated Approach, R.D. KLAFTER, T. A. Chmielewski, and M. Negin, PHI
10. Robot Technology: Fundamentals: J. G. Keramas, Cengage Learning

PEEE5301 **OPTOELECTRONICS DEVICES & INSTRUMENTATION** (3-0-0)

Module –I

Wave Optics: 12 Hrs

Wave properties of light: Propagation, polarization, interference, diffraction, transmission of light through slab and cylindrical waveguides.

Optical Fiber:

Construction of step and graded index fibers, single mode and multimode fibers, loss and dispersion characteristics;

Module –II

12 Hrs

Fiber optic components: couplers, splicer, polarizer.

Sources and Detectors :

Sources: LED, Lasers-fundamentals, conditions for oscillations, construction and principle of operation of gas and semiconductor, pulsed and continuous type lasers;

Detectors: photodiodes- PN, PIN and APD.

Module –III

Optoelectronic Instrumentation 12 lectures

Modulation techniques: intensity, polarization, interference, electro-optic, electromagnetic; Sensing techniques for displacement, pressure, acceleration, flow, current and voltage measurement, Fiber optic gyroscope, Distributed fiber optic sensors- OTDR and OFDR principles.

Text Books:

1. A. Ghatak and K. Tyagrajan: Introduction to Fiber Optics: Cambridge University Press, New Delhi, 2004. (Chapter 2, Sections 7.2-7.3, Chapter 3, Sections 4.3,8.2, 17.2, 17.8, Section 11.3, 11.6, Chapter 12, Chapter 18)
2. J. Wilson and J.F.B. Hawkes: Optoelectronics: An Introduction (2/e), PHI, New Delhi, 2001. (Chapter 1, Sections 3.1-3.2; 8.1-8.2, Sections 8.3-8.4, 8.5, Sections 4.6, 5.1-5.6, 5.10.2, 7.2, Sections 3.4, 3.7, 3.8, Chapter 10)

Reference Books:

1. J.P. Bentley- Principles of Measurement Systems (3/e), Pearson Education, New Delhi, 2007.
2. N. Bala Saraswathi and I. Ravi Kumar- Principles of Optical Communications and Optoelectronics (2/e), Laxmi Publications, New Delhi, 2007.
3. M.K. Ghosh, S.Sen and S. Mukhopadhyay (ed.)- Measurement and Instrumentation: Trends and Applications, Ane Books, New Delhi, 2008.
4. R.P.Khare: Fibre Optics & Optoelectronics, Oxford University Press, New Delhi, 2010.

PCEL7303 MICROPROCESSOR & MICROCONTROLLER LAB

(0-0-3)

List of Experiment :

8085

1. Addition, subtraction, multiplication and division of two 8 bit numbers
2. Smallest/largest number among n numbers in a given data array, Binary to Gray code, Hexadecimal to decimal conversion

Interfacing

1. Generate square wave on all lines of 8255 with different frequencies
2. Study of stepper motor and its operations

Optional (any two)

1. Study of traffic light controller
2. Study of elevator simulator
3. Generation of square, triangular and saw tooth wave using D to A Converter
4. Study of 8253 and its operation (Mode0, Mode2, Mode3)
5. Study of Mode0, Mode1 and BSR Mode operation of 8255
6. Study of 8279 (keyboard and display interface)
7. Study of 8259 Programmable Interrupt Controller

8051 Microcontroller

1. Initialize data to registers and memory using immediate, register, direct and indirect Addressing mode.

Optional (any one)

1. Addition and subtraction of 16 bit numbers
2. Multiplication and division of two 16 bit numbers
3. Transfer a block of data to another memory location using indexing
4. Operation of 8255 using 8051 microcontroller

8086

1. Addition, subtraction, multiplication and division of 16 bit numbers, 2's complement of a 16 bit number

Optional (any one)

1. Finding a particular data element in a given data array
2. Marking a specific bit of a number using look-up table
3. Largest/smallest number of a given data array
4. To separate the odd and even numbers from a given data array
5. Sorting an array of numbers in ascending/descending order

OPERATING SYSTEM LABORATORY (0-0-3)

1. Basic UNIX Commands.
2. UNIX Shell Programming.
3. Programs on process creation and synchronization, inter process communication including shared memory, pipes and messages. (Dining Philosopher problem / Cigarette Smoker problem / Sleeping barber problem)
4. Programs on UNIX System calls.
5. Simulation of CPU Scheduling Algorithms. (FCFS, RR, SJF, Priority, Multilevel Queuing)
6. Simulation of Banker's Algorithm for Deadlock Avoidance, Prevention
7. Program for FIFO, LRU, and OPTIMAL page replacement algorithm.
