BIJU PATNIK UNIVERSITY OF TECHNOLOGY

Information Technology (IT)

3rd Semester

4th Semester

Theory

Contact Hours

Theory

Contact Hours

Code

Subject

L-T-P Credit

Code

Subject

L-T-P Credit

BSCM1205 Mathematics-III

3-1-0

4

BSCM1211 Discrete Mathematics

3-0-0

3

BEES2211 Network Theory

3-1-0

4

PCCS4203

System Programming

3-0-0

3

BSCP1207 Physics of

Semiconductor Devices

3-0-0

3

PCCS4204 Design and Analysis of

Algorithm

3-1-0

4

BECS2207 Object Oriented

Programming

3-1-0

4

PCCS4205 Database Engineering

3-1-0

4

PCEC4201 Analog Electronics

Circuit

3-1-0

4

PCEC4202 Digital Electronics

Circuit

3-1-0

4

HSSM3204

HSSM3205

Engineering Economics

and Costing

Or

Organizational Behavior

3-0-0

3

HSSM3205

HSSM3204

Organizational Behavior

Or

Engineering Economics

and Costing

3-0-0

3

Theory Credits

22

Theory Credits 21

Practical / Sessional

Practical / Sessional

HSSM7203 COMMUNICATION AND

INTERPERSONAL SKILLS

FOR CORPORATE

READINESS LAB

0-0-3 2

PCEC7202 Digital Electronics

Circuit Lab

0-0-3

2

PCEC7201 Analog Electronics Lab 0-0-3 2

PCCS7204 Design and Analysis of

Algorithm Lab

0-0-3

2

BECS7207 Object Oriented

Programming Lab.

0-0-3 2

PCCS7205 Database Engg. Lab

0-0-3

2

Practical/Sessional Credits 6

Practical/Sessional Credits 6

TOTAL SEMESTER CREDITS 28

TOTAL SEMESTER CREDITS 27 Page 2

BSCM1205 Mathematics - III

Module-I

(18 hours)

Partial differential equation of first order, Linear partial differential equation, Non-linear partial differential equation, Homogenous and non-homogeneous partial differential equation with constant co-efficient, Cauchy type, Monge's method, Second order partial differential equation. The vibrating string, the wave equation and its solution, the heat equation and its solution, Two dimensional wave equation and its solution, Laplace equation in polar, cylindrical and spherical coordinates, potential.

Module-II

(12 hours)

Complex Analysis:

Analytic function, Cauchy-Riemann equations, Laplace equation, Conformal mapping,

Complex integration: Line integral in the complex plane, Cauchy's integral theorem, Cauchy's integral formula, Derivatives of analytic functions

Module –III

(10 hours)

Power Series, Taylor's series, Laurent's series, Singularities and zeros, Residue integration method, evaluation of real integrals.

Text books:

1. E. Kreyszig," Advanced Engineering Mathematics:, Eighth Edition, Wiley India

Reading Chapters: 11,12(except 12.10),13,14,15

2. B.V. Ramana, " Higher Engineering Mathematics", McGraw Hill Education, 2008

Reading chapter: 18

Reference books:

1. E.B. Saff, A.D.Snider, " Fundamental of Complex Analysis", Third Edition, Pearson

Education, New Delhi

2. P. V. O'Neil, "Advanced Engineering Mathematics", CENGAGE Learning, New Delhi Page 3

BEES2211 Network Theory

MODULE- I

(14 Hrs)

1. NETWORK TOPOLOGY: Graph of a network, Concept of tree, Incidence matrix, Tie-set matrix, Cut-set matrix, Formulation and solution of network equilibrium equations on loop and node basis.

2. NETWORK THEOREMS & COUPLED CIRCUITS: Substitution theorem, Reciprocity theorem, Maximum power transfer theorem, Tellegen's theorem, Millman's theorem, Compensation theorem, Coupled Circuits, Dot Convention for representing coupled circuits, Coefficient of coupling, Band Width and Q-factor for series and parallel resonant circuits.

MODULE- II

(13 Hrs)

3. LAPLACE TRANSFORM & ITS APPLICATION: Introduction to Laplace Transform, Laplace transform of some basic functions, Laplace transform of periodic functions, Inverse Laplace transform, Application of Laplace transform: Circuit Analysis (Steady State and Transient).

4. TWO PORT NETWORK FUNCTIONS & RESPONSES: z, y, ABCD and h-parameters, Reciprocity and Symmetry, Interrelation of two-port parameters, Interconnection of two-port networks, Network Functions, Significance of Poles and Zeros, Restriction on location of Poles and Zeros, Time domain behaviour from Pole-Zero plots.

MODULE- III

(13 Hrs)

5. FOURIER SERIES & ITS APPLICATION: Fourier series, Fourier analysis and evaluation of coefficients, Steady state response of network to periodic signals, Fourier transform and convergence, Fourier transform of some functions, Brief idea about network filters (Low pass, High pass, Band pass and Band elimination) and their frequency response.

6. NETWORK SYNTHESIS: Hurwitz polynomial, Properties of Hurwitz polynomial, Positive real

functions and their properties, Concepts of network synthesis, Realization of simple R-L, R-C

and L-C functions in Cauer-I, Cauer-II, Foster-I and Foster-II forms.

Text Book:

1. Network Theory – P K Satpathy, P Kabisatpathy, S P Ghosh and A K Chakraborty – Tata

McGraw Hill, New Delhi.

Reference Book(s):

2. Network Analysis – M E Van Valkenburg – Pearson Education.

3. Network Synthesis – M E Van Valkenburg – Pearson Education.

4. Network Analysis and Synthesis – Franklin F. Kuo – Wiley Student Edition.

5. Fundamentals of Electric Circuits – Alexander & Sadiku – Tata McGraw Hill.

6. Linear Circuits Analysis and Synthesis – A Ramakalyan – Oxford University Press.

7. Problems & Solutions in Electric Circuit Analysis – Sivananda & Deepa – Jaico Book.

8. Network Theory, Smarajit Ghosh, PHI. Page 4

BSCP 1207 Physics of Semiconductor Devices

Module-I (10 Hours)

1. Introduction to the quantum theory of solids: Formation of energy bands, The k-space diagram

(two and three dimensional representation), conductors, semiconductors and insulators.

2. Electrons and Holes in semiconductors: Silicon crystal structure, Donors and acceptors in the

band model, electron effective mass, Density of states, Thermal equilibrium, Fermi-Dirac

distribution function for electrons and holes, Fermi energy. Equilibrium distribution of electrons &

holes: derivation of n and p from D(E) and f(E), Fermi level and carrier concentrations, The np

product and the intrinsic carrier concentration. General theory of n and p, Carrier concentrations at

extremely high and low temperatures: complete ionization, partial ionization and freeze-out.

Energy-band diagram and Fermi-level, Variation of EF with doping concentration and temperature.

3. Motion and Recombination of Electrons and Holes: Carrier drift: Electron and hole mobilities, Mechanism of carrier scattering, Drift current and conductivity.

Module II (11 Hours)

4. Motion and Recombination of Electrons and Holes (continued): Carrier diffusion: diffusion current, Total current density, relation between the energy diagram and potential, electric field. Einstein relationship between diffusion coefficient and mobility. Electron-hole recombination, Thermal generation.

5. PN Junction: Building blocks of the pn junction theory: Energy band diagram and depletion layer of a pn junction, Built-in potential; Depletion layer model: Field and potential in the depletion layer, depletion-layer width; Reverse-biased PN junction; Capacitance-voltage characteristics; Junction breakdown: peak electric field. Tunneling breakdown and avalanche breakdown; Carrier injection under forward bias-Quasi-equilibrium boundary condition; current continuity equation; Excess carriers in forward-biased pn junction; PN diode I-V characteristic, Charge storage.

6. The Bipolar Transistor: Introduction, Modes of operation, Minority Carrier distribution, Collector current, Base current, current gain, Base width Modulation by collector current, Breakdown mechanism, Equivalent Circuit Models - Ebers -Moll Model.

Module III (12 Hours)

7. Metal-Semiconductor Junction: Schottky Diodes: Built-in potential, Energy-band diagram, I-V characteristics, Comparison of the Schottky barrier diode and the pn-junction diode. Ohmic contacts: tunneling barrier, specific contact resistance.

8. MOS Capacitor: The MOS structure, Energy band diagrams, Flat-band condition and flat-band voltage, Surface accumulation, surface depletion, Threshold condition and threshold voltage, MOS C-V characteristics, Qinv in MOSFET.

9. MOS Transistor: Introduction to the MOSFET, Complementary MOS (CMOS) technology, V-I

Characteristics, Surface mobilities and high-mobility FETs, JFET, MOSFET Vt, Body effect and

steep retrograde doping, pinch-off voltage, Page 5

Text Books:

1. Modern Semiconductor Devices for Integrated Circuits, Chenming Calvin Hu, Pearson

Education/Prentice Hall, 2009.

2. Semiconductor Physics and Devices, 3

rd

Edition, Donald A. Neamen, Tata McGraw Hill

Publishing Company Limited, New Delhi.

Reference Books:

1. Fundamentals of Semiconductor Devices, M.K. Achuthan and K.N. Bhatt, Tata McGraw Hill

Publishing Company Limited, New Delhi.

2. Solid State Electronics Devices, 6

th

Edition, Ben. G. Stretman and Sanjay Banarjee, Pearson

Education, New Delhi.

3. Physics of Semiconductor Devices, 3

rd

Edition, S.M. Sze and Kwok K. Ng, Wiley India Pvt.

Limited, New Delhi.

4. Physics of Semiconductor Devices, 2

nd

Edition, Dillip K. Roy, University Press (India) Pvt. Ltd.,

Hyderabad.

5. Solid State Electronics Devices, D.K. Bhattacharya and Rajnish Sharma, Oxford University Press, New Delhi.

PCCS2207 Object Oriented Programming

Module I

(08 hrs)

Introduction to object oriented programming, user defined types, structures, unions, polymorphism, encapsulation. Getting started with C++ syntax, data-type, variables, strings, functions, default values in functions, recursion, namespaces, operators, flow control, arrays and pointers.

Module II

(16 hrs)

Abstraction mechanism: Classes, private, public, constructors, destructors, member data, member functions, inline function, friend functions, static members, and references.

Inheritance: Class hierarchy, derived classes, single inheritance, multiple, multilevel, hybrid inheritance, role of virtual base class, constructor and destructor execution, base initialization using derived class constructors.

Polymorphism: Binding, Static binding, Dynamic binding, Static polymorphism: Function Overloading, Ambiguity in function overloading, Dynamic polymorphism: Base class pointer, object slicing, late binding, method overriding with virtual functions, pure virtual functions, abstract classes.

Operator Overloading: This pointer, applications of this pointer, Operator function, member and non member operator function, operator overloading, I/O operators.

Exception handling: Try, throw, and catch, exceptions and derived classes, function exception declaration, unexpected exceptions, exception when handling exceptions, resource capture and release. Page 6

Module III

(16 hrs)

Dynamic memory management, new and delete operators, object copying, copy

constructor, assignment operator, virtual destructor.

Template: template classes, template functions.

Standard Template Library: Fundamental idea about string, iterators, hashes, iostreams

and other types.

Namespaces: user defined namespaces, namespaces provided by library.

Object Oriented Design, design and programming, role of classes.

Text Books:

1. Object Oriented Programming with C++ by E. Balagurusamy, McGraw-Hill

Education (India)

2. ANSI and Turbo C++ by Ashoke N. Kamthane, Pearson Education

Reference Books:

1. Big C++ - Wiley India

2. C++: The Complete Reference- Schildt, McGraw-Hill Education (India)

3. C++ and Object Oriented Programming – Jana, PHI Learning.

4. Object Oriented Programming with C++ - Rajiv Sahay, Oxford

5. Mastering C++ - Venugopal, McGraw-Hill Education (India)

PCES4201 Analog Electronics Circuit

MODULE – I (12 Hours)

1.

MOS Field-Effect Transistor: Principle and Physical Operation of FETs and

MOSFETs. P-Channel and N-Channel MOSFET, Complimentary MOS, V-I

Characteristics of E- MOSFETS and D-MOSFETS, MOSFETS as an Amplifier and a

Switch

(4

Hours)

2.

Biasing of BJTs: Load lines (AC and DC), Operating Points, Fixed Bias and Self Bias,

DC Bias with Voltage Feedback, Bias Stabilization, Design Operation.

(4

Hours)

3.

Biasing of FETs and MOSFETs: Fixed Bias Configuration and Self Bias

Configuration, Voltage Divider Bias and Design

(4

Hours)

MODULE – II (17 Hours)

4.

Small Signal Analysis of BJTs: Small-Signal Equivalent-Circuit Model, Graphical

Determination of h-parameters Small Signal Analysis of CE, CC, CB Amplifier with and

without RE. Effect of RS and RL on CE Amplifier, Emitter Follower, Analysis of Page 7

Cascade, Darlington Connection and Current Mirror Circuits using BJTs.

(6

Hours)

5.

Small Signal Analysis of FETs: Small-Signal Equivalent-Circuit Model, Small Signal

Analysis of CS, CD, CG Amplifier with and without RS. Effect of RSIG and RL on CS

Amplifier, Analysis of Source Follower and Cascaded System using FETs.

(6

Hours)

6.

High Frequency Response of FETs and BJTs: Low and High Frequency Response of

BJTs and FETs, The Unit gain – frequency (ft), Frequency Response of CS Amplifier,

Frequency Response of CE Amplifier, Multistage Frequency Effects, Miller Effect

Capacitance, Square Wave Testing.

(5

Hours)

MODULE – III (12 hours)

7.

Feedback and Oscillators: Feedback Concepts, Four Basic Feedback Topologies,

Practical Feedback Circuits, Feedback Amplifier Stability using Nyquist Plot, Basic

Principle of Sinusoidal Oscillator, Wein-Bridge, Phase Shift and Crystal Oscillator

Circuits.

(4

Hours)

8.

Operational Amplifier: Ideal Op-Amp, Differential Amplifier, Op-Amp Parameters,

Slew rate, Non-inverting Configurations, Effect of Finite Open-loop and Closed-loop

Gain, Differentiator and Integrator, Instrumentation amplifier, µA 741-Op-Amp . (5

Hours)

9.

Power Amplifier: Classifications, Class-A and Class-B Amplifier Circuits, Transfer

Characteristics, Power Dissipation and Conversion Efficiency of Power Amplifiers. (3

Hours)

Text Books:

1.

Electronic Devices and Circuits theory, 9

th

/10

th

Edition, R.L. Boylestad and L.Nashelsky

(Selected portions of Chapter 4, 5, 6, 7, 8, 9, 10, 11, 12, and 14), Pearson Education, New

Delhi.

2.

Microelectronics Circuits, 5

th

Edition, International Student Edition Sedra and Smith

(Selected portion of Chapter 2,4, 5, 6, 8, 13, and 14), Oxford University Press, New

Delhi.

3.

Electronic Devices and Circuits, 3

rd

Edition, Jimmie J. Cathey adapted by Ajay Kumar

Singh, Tata McGraw Hill Publishing Company Ltd., New Delhi. (For Problem Solving)

Reference Books:

1.

Electronics Circuits Analysis and Design, 3

rd

Edition, Donald A. Neamen, Tata McGraw

Hill Publishing Company Ltd., New Delhi.

2.

Milliman's Electronics Devices and Circuits, 2

nd

Edition, J. Milliman, C. Halkias, S. Jit.,

Tata McGraw Hill Education Pvt. Ltd., New Delhi

3.

Integrated Electronics: Analog and Digital Circuits and Systems, J. Milliman, C. Halkias,

Tata McGraw Hill Publishing Company Ltd., New Delhi.

4.

Microelectronic Circuits: Analysis and Design, India Edition, M.H. Rashid, PWS

Publishing Company, a division of Thomson Learning Inc. Page 8

HSSM3204 Engineering Economics & Costing

Module-I:

(12 hours)

Engineering Economics – Nature and scope, General concepts on micro & macro

economics. The Theory of demand, Demand function, Law of demand and its

exceptions, Elasticity of demand, Law of supply and elasticity of supply. Determination

of equilibrium price under perfect competition (Simple numerical problems to be

solved). Theory of production, Law of variable proportion, Law of returns to scale.

Module-II:

(12 hours)

Time value of money – Simple and compound interest, Cash flow diagram, Principle of economic equivalence. Evaluation of engineering projects – Present worth method, Future worth method, Annual worth method, internal rate of return method, Cost-benefit analysis in public projects. Depreciation policy, Depreciation of capital assets, Causes of depreciation, Straight line method and declining balance method.

Module-III:

(12 hours)

Cost concepts, Elements of costs, Preparation of cost sheet, Segregation of costs into fixed and variable costs. Break-even analysis-Linear approach. (Simple numerical problems to be solved)

Banking: Meaning and functions of commercial banks; functions of Reserve Bank of India. Overview of Indian Financial system.

Text Books:

1. Riggs, Bedworth and Randhwa, "Engineering Economics", McGraw Hill Education India.

2. M.D. Mithani, Principles of Economics.

Reference Books :

1.

Sasmita Mishra, "Engineering Economics & Costing ", PHI

2.

Sullivan and Wicks, " Engineering Economy", Pearson

3.

R.Paneer Seelvan, " Engineering Economics", PHI

4.

Gupta, " Managerial Economics", TMH

5.

Lal and Srivastav, " Cost Accounting", TMH

HSSM 3205 Organizational Behaviour

Module I :

The study of Organizational Behaviour : Defination and Meaning, Why Study OB

Learning – Nature of Learning, How Learning occurs, Learning and OB.

Foundations of Individual Behaviour : Personality – Meaning and Defination, Determinants of

Personality, Personality Traits, Personality and OB.

Perception – Meaning and Definition, Perceptual Process, Importance of Perception in OB.

Motivation – Nature and Importance, Herzberg's Two Factor Theory, Maslow's Need

Hierarchy Theory, Alderfer's ERG Theory, Evaluations.

Module II :

Organizational Behaviour Process : Communication – Importance, Types, Gateways and

Barriers to Communication, Communication as a tool for improving Interpersonal

Effectiveness, Groups in Organizations – Nature, Types, Why do people join groups, Group

Cohesiveness and Group Decision-making Managerial Implications, Effective Team Building.

Leadership-Leadership & Management, Theories of Leadership-Trait theory, Leader

Behaviour theory, Contingency Theory, Leadership and Followership, How to be an effective

Leader, Confict-Nature of Conflict and Conflict Resolution. An Introduction to Transactional

Analysis (TA).

Module-III :

Organization : Organizational Culture – Meaning and Definition, Culture and Organizational

Effectiveness. Introduction to Human Resource Management-Selection, Orientation, Training

and Development, Performance Appraisal, Incentives Organizational Change – Importance of

Change, Planned Change and OB techniques. International Organisational Behaviour – Trends

in International Business, Cultural Differences and Similarities, Individual and Interpersonal

Behaviour in Global Perspective.

Text Books :

1. Keith Davis, Organisational Behaviour, McGraw-Hill.

2. K.Aswathappa, Organisational Behaviour, Himalaya Publishing House.

Reference Books :

1. Stephen P. Robbins, Organisational Behaviour, Prentice Hall of India

2. Pradip N. Khandelwal, Organizational Behaviour, McGraw-Hill, New Delhi.

3. Uma Sekaran, "Organizational Behaviour", TATA McGraw-Hill, New Delhi.

4. Steven L McShane, Mary Ann Von Glinow, Radha R Sharma" Organizational

Behaviour" , TATA McGraw- Hill.

5. D.K. Bhattachayya, "Organizational Behaviour", Oxford University Press

6. K.B.L.Srivastava & A.K.Samantaray, "Organizational Behaviour" India TechPage 10

HSSM7203 Communication & Interpersonal skills for

Corporate Readiness Lab.

Lab

30 hours

This course will focus on communication in professional (work-related) situations of the kind that

BPUT graduates may expect to encounter on entering the professional domain.

Some typical forms of work-related communication, oral or written, are listed below. Practice

activities for all four skills can be designed around these or similar situations.

1. Gaining entry into an organization

i.

Preparing job-applications and CVs

ii. Facing an interview

iii. Participating in group discussion (as part of the recruitment process)

2 In-house communication

a. Superior/ Senior → subordinate / junior (individual → individual / group)

i. Welcoming new entrants to the organization, introducing the workplace culture

etc

ii. Briefing subordinates / juniors : explaining duties and responsibilities etc.

ii. Motivating subordinates / juniors ('pep talk')

iii. Instructing/ directing subordinates/ juniors

iv. Expressing / recording appreciation, praising / rewarding a subordinate or junior

v. Reprimanding / correcting / disciplining a subordinate/junior (for a lapse) ; asking

for an explanation etc.

b. Subordinate / Junior → Superior / Senior

i. Responding to the above

ii. Reporting problems / difficulties / deficiencies

iii.Offering suggestions Page 11

PCES7201 Analog Electronics Lab

List of Experiments

(At least 10 out of 13 experiments should be done)

1.

BJT bias circuit – Design, assemble and test.

2.

JEET/MOSFET bias circuits – Design, assemble and test.

3.

Design, assemble and test of BJT common-emitter circuit – D.C and A.C performance: Voltage gain, input impedance and output impedance with bypassed and un-bypassed emitter resistor.

4.

Design, assemble and test of BJT emitter-follower – D.C and A.C performance: A.C. voltage gain, input impedance and output impedance.

5.

Design, assemble and Test of JFET/MOSFET common-source and common-drain amplifiers – D.C and A.C performance: Voltage gain, input impedance and output impedance.

6.

Frequency response of a common-emitter amplifier: low frequency, high frequency and mid frequency response.

7.

Differential amplifiers circuits: D.C bias and A.C operation without and with current source.

8.

Study of Darlington connection and current mirror circuits.

9.

OP-Amp Frequency Response and Compensation.

10. Application of Op-Amp as differentiator, integrator, square wave generator.

11. Square wave testing of an amplifier.

12. R.C phase shift oscillator/Wien-Bridge Oscillator using OP-Amp/Crystal Oscillator.

PCCS7209 Object Oriented Programming Lab

1. Programs on concept of classes and objects.(1 class)

2. Programs using inheritance.(1 class)

(i) Single inheritance

(ii) Multiple inheritance

(iii) Multi level inheritance

(iv) Use of virtual base classes

3. Programs using static polymorphism.(1 class)

(i) Function overloading

(ii) Ambiguities while dealing with function overloading

4. Programs on dynamic polymorphism.(1 class)

(i) Use of virtual functions

(ii) Use of abstract base classes

5. Programs on operator overloading.(1 class)

(i) Operator overloading using member operator functions.

(ii) Operator overloading using non member operator functions.

(iii) Advantages of using non member operator functions.

6. Programs on dynamic memory management using new, delete operators.(1 class)

7. Programs on copy constructor and usage of assignment operator.(1 class)

8. Programs on exception handling .(1 class)

9. Programs on generic programming using template function and template class.(1 class)

4

th

Semester

BSCM1211 Discrete Mathematics

Module- I (14 Hours)

Propositional logic, Propositional Equivalence, Predicates and Quantifiers, Nested Quantifiers,

Rules of Inference, Proof methods and Strategies, Sequences and Summations, Mathematical

Induction, Recursive definition and structural induction, Program Correction

Recurrence relation, Solution to recurrence relation, Generating functions, Inclusion and

exclusion, Application of Inclusion and Exclusion Principle, Relation and their properties, Closure

of relations, Equivalence relations, Partial orderings.

Module-II (13 hours)

Introduction to graph theory, Graph terminology, Representation of graphs, Isomorphism,

Connectivity, Euler and Hamiltonian paths, Shortest path problems, Planar graph, Graph coloring,

Introduction to trees, Application of trees, Tree Traversal, Minimum Spanning tree.

Module-III (13 hours)

Semi groups, Monoids, Groups, Subgrorups, Cosets, Lagrange theorem, Permuation groups,

Group codes, isomorphism, Homomorphisms, Normal subgroups, Rings, Integral Domain and

Fields.

Algebraic systems, Lattices, Distributive and Complemented Lattices, Boolean Lattices and

Boolean Algrebra, Boolean Functions and Boolean Expressions.

Text Books:

1. Kenneth H. Rosen, "Discrete Mathematics and its Applications", Sixth Edition, 2008,

Tata McGraw Hill Education , New Delhi.

Chapters: 1, 2(2.4), 4, 6(6.1, 6.2, 6.4-6.6), 7, 8, 9

2. C. L. Liu and D. Mohaptra, "Elements of Discrete Mathematics", Third Edition, 2008,

Tata McGraw Hill Education, New Delhi

Chapters: 10 (10.1- 10.10), 11(11.1 – 11.7)

Reference Books:

1. Ralph P. Grimaldi, "Discrete and Combinatorial Mathematics", Fifth Edition, 2005, Pearon

Education, New Delhi.

2. Kolman, Busby, Ross, "Discrete Mathematics", Fifth Edition, PHI Publication.

3. J.L. Gersting, " Mathematical Structure for Computer Science: A modern treatment to

Discrete Mathematics' Sixth Edition, W. H. Freeman and Macmillan (India).

4. Eric Gossett, ' Discrete Mathematics with Proof, Second Edition, Wiley India Pvt Ltd

5. Thomas Koshy, " Discrete Mathematics and Applications:, Second Edition, Elsevier

Publication (India), New Delhi.

6. J.L. Mott, A.Candell & I. Bekar, Discrete Mathematics for Computer Scientists and

Mathematicians, PHI. Page 14

PCCS4202 System Programming

Module I

(10 Hrs)

Introduction: System Software, Application Software, Machine Structure, Evolution of

components of a programming system (Assembler, Loader, Macros, Compiler, Formal

Systems), Evolution of Operating Systems, Functions of Operating System.

Machine Structure: General Machine Structure, Approach to a new machine, Memory

Registers, Data, Instructions, special features.

Machine Language: Long Way, No looping, Address Modification, Looping

Introduction to Assembly Language Program

Module II

(10 Hrs)

Assemblers: Design Procedure, Design of Assembler, Table Processing.

Macros Language and Macro Processor: Macro Instructions, Features of a Macro Facility,

Implementation.

Loaders: Loader Schemes, Design of an Absolute Loader, Direct Linking loader, Bootstrap

Loader.

Module III

(12 Hrs)

Programming Languages: Importance of High Level Languages, Features, Data Types and

Data Structures, Storage Allocation and Scope Name, Accessing Flexibility, Functional

Modularity, Asynchronous Operations, Extensibility and Compile time Macros.

Formal Systems: Uses of Formal Systems, Formal Specification, Formal Grammars, Backus-

Naur Form, Canonic Systems, Canonic Systems vs Formal Systems

Compilers: Introduction to Compilers, Phases of a compiler(Lexical Phase, Syntax Phase,

Interpretation Phase, Optimization, Code Generation, Assembly, passes of a compiler),

Intermediate Form, Storage Allocation, Code Generation, Data Structure

Text Book:

Systems Programming by John J Donovan (McGraw-Hill Education)

Reference Book:

(1) System Software: An Introduction to systems programming by Leland Beck

(Pearson)

(2) System Software : Nityashri,(McGraw-Hill Education)

(3) Operating System and System Programming – Dhamdhere (McGraw-Hill Education)

(4) System Programming with C and Unix.- Hoover (Pearson Education) Page 15

PCCS4203 Design and Analysis of Algorithm

Module- I

(12 Hours)

Introduction to design and analysis of algorithms, Growth of Functions (Asymptotic notations, standard notations and common functions), Recurrences, solution of recurrences by substitution, recursion tree and Master methods, worst case analysis of Merge sort, Quick sort and Binary search, Design & Analysis of Divide and conquer algorithms.

Heapsort : Heaps, Building a heap, The heapsort algorithm, Priority Queue, Lower bounds for sorting.

Module – II

(16 Hours)

Dynamic programming algorithms (Matrix-chain multiplication, Elements of dynamic programming, Longest common subsequence)

Greedy Algorithms - (Assembly-line scheduling, Achivity- selection Problem, Elements of Greedy strategy, Fractional knapsac problem, Huffman codes).

Data structure for disjoint sets:- Disjoint set operations, Linked list representation, Disjoint set forests.

Module – III

(12 Hours)

Graph Algorithms: Breadth first and depth-first search, Minimum Spanning Trees, Kruskal and Prim's algorithms, single- source shortest paths (Bellman-ford and Dijkstra's algorithms), All-pairs shortest paths (Floyd – Warshall Algorithm). Back tracking, Branch and Bound.

Fast Fourier Transform, string matching (Rabin-Karp algorithm), NP - Completeness (Polynomial time, Polynomial time verification, NP - Completeness and reducibility, NP-

Complete problems (without Proofs), Approximation algorithms (Vertex-Cover Problem, Traveling Salesman Problem).

Text Book:

T.H. Cormen, C.E. Leiserson, R.L. Rivest, C.Stein : Introduction to algorithms -2nd edition, PHI,2002. Chapters: 1,2,3,4 (excluding 4.4), 6, 7, (7.4.1), 8 (8.1) 15 (15.1 to 15.4), 16 (16.1, 16.2, 16.3), 21 (21.1,21.2,21.3), 22(22.2,22.3), 23, 24(24.1,24.2,24.3), 25 (25.2), 30,32 (32.1, 32.2) 34, 35(35.1, 35.2)

Reference Books:

1. Algorithms – Berman, Cengage Learning

2. Computer Algorithms: Introduction to Design & Analysis, 3rd edition-by Sara Baase, Allen Van Gelder, Pearson Education

3. Fundamentals of Algorithm-by Horowitz & Sahani, 2nd Edition, Universities Press.

4. Algorithms By Sanjay Dasgupta, Umesh Vazirani – McGraw-Hill Education

5. Algorithm Design – Goodrich, Tamassia, Wiley India. Page 16

PCCS4204 Database Engineering

Module1:

(12 Hrs)

Introduction to database Systems, Basic concepts &Definitions, Data Dictionary, DBA, File-oriented system vs. Database System, Database Language.

Database System Architecture-Schemas, Sub Schemas & Instances, 3-level database architecture, Data Abstraction, Data Independence, Mappings, Structure, Components & functions of DBMS, Data models, Mapping E-R model to Relational, Network and Object Oriented Data models, types of Database systems,

Storage Strategies: Detailed Storage Architecture, Storing Data, Magnetic Disk, RAID, Other

Disks, Magnetic Tape, Storage Access, File & Record Organization, File Organizations & Indexes, Order Indices, B+ Tree Index Files, Hashing

Module2:

(16 Hrs)

Relational Algebra, Tuple & Domain Relational Calculus, Relational Query Languages: SQL and QBE.

Database Design :-Database development life cycle(DDLC),Automated design tools, Functional dependency and Decomposition, Dependency Preservation & lossless Design, Normalization, Normal forms:1NF, 2NF,3NF,and BCNF, Multi-valued Dependencies, 4NF & 5NF.

Query processing and optimization: Evaluation of Relational Algebra Expressions, Query optimization.

Module3:

(12 Hrs)

Transaction processing and concurrency control: Transaction concepts, concurrency control, locking and Timestamp methods for concurrency control.

Database Recovery System: Types of Data Base failure & Types of Database Recovery, Recovery techniques

Advanced topics: Object-Oriented & Object – Relational Database, Parallel & Distributed Database, Introduction to Data warehousing & Data Mining

Text Books:

1. Database System Concepts by Sudarshan, Korth (McGraw-Hill Education)

2. Fundamentals of Database System By Elmasari &Navathe- Pearson Education

References Books:

(1) An introduction to Database System – Bipin Desai, Galgotia Publications

(2) Database System: concept, Design & Application by S.K.Singh (Pearson Education)

(3) Database management system by leon &leon (Vikas publishing House).

(4) Database Modeling and Design: Logical Design by Toby J. Teorey, Sam S. Lightstone,

and Tom Nadeau, "", 4th Edition, 2005, Elsevier India Publications, New Delhi

(5) Fundamentals of Database Management System – Gillenson, Wiley India Page 17

PCEC4202 Digital Electronics Circuit

MODULE – I

(11 Hours)

1. Number System: Introduction to Binary Numbers, Data Representation, Binary, Octal, Hexadecimal and

Decimal Number System and their Conversion.

(2 Hours)

2. Boolean Algebra and Logic Gates: Basic Logic Operation and Identities, Algebraic Laws, NOR and

NAND Gates, Useful Boolean Identities, Algebraic Reduction, Complete Logic Sets, Arithmetic Operation

using 1's and 2`s Compliments, Signed Binary and Floating Point Number Representation.

(4 Hours)

3. Combinational Logic Design: Specifying the Problem, Canonical Logic Forms, Extracting Canonical

Forms, EX-OR Equivalence Operations, Logic Array, K-Maps: Two, Three and Four variable K-maps,

NAND and NOR Logic Implementations.

(5 Hours)

MODULE – II

(15 Hours)

4. Concepts in VHDL: Basic Concepts, Using a Hardware Description Language, Defining Module in VHDL,

Structural and Combinational Modelling, Binary Words, Libraries, Learning VHDL.

(4 Hours)

5. CMOS Logic Circuits: Voltages as Logic Variables, Logic Delay Times: Output Switching Times,

Propagation Delay, Fan-In and Fan-out, Extension to other Logic Gate.

C-MOS Electronics, MOSFETS, The NOT Function in C-MOS: Complimentary Pairs and the C-MOS

Invertors, Logic Formation Using MOSFETS: the NAND and NOR Gate, C-MOS Logic Connection,

Complex Logic Gates in C-MOS: 3-input Logic Gates, A general 4-input Logic Gate, Logic Cascades.

(6 Hours)

6. Introduction to VLSI: Introduction, Lithography and Patterning, MOSFET Design Rules, Basic Circuit

Layout, MOSFET Arrays and AOI Gates, Cells, Libraries, and Hierarchical Design, Floor Plans and

Interconnect Wiring.

(5 Hours)

MODULE – III

(16 hours)

7. Logic Components: Concept of Digital Components, An Equality Detector, Line Decoder, Multiplexers and

De-multiplexers, Binary Adders, Subtraction and Multiplication.

(5 Hours)

8. Memory Elements and Arrays: General Properties, Latches, Clock and Synchronization, Master-Slave

and Edge-triggered Flip-flops, Registers, RAM and ROMs, C-MOS Memories. (6 Hours)

9. Sequential Network: Concepts of Sequential Networks, Analysis of Sequential Networks: Single State and

Multivariable Networks, Sequential Network Design, Binary Counters, Importance of state machine.

(5 Hours)

Text Books:

1. A First Course in Digital System Design: An Integrated Approach, India Edition, John P. Uyemura, PWS

Publishing Company, a division of Thomson Learning Inc.

2. Digital Systems – Principles and Applications, 10th Edition, Ronald J. Tocci, Neal S. Widemer and Gregory

L. Moss, Pearson Education.

3. Digital Design, Robert K. Dueck, CENGAGE Learning.

Reference Books:

1. Digital Principles and Applications, 6th Edition, Donald P. Leach, Albert Paul Malvino and Goutam Saha,

Tata McGraw Hill Publishing Company Ltd., New Delhi.

2. Digital Fundamentals, 5th Edition, T.L. Floyd and R.P. Jain, Pearson Education, New Delhi.

3. Digital Electronics, Principles and Integrated Circuit, Anil K. Jain, Wiley India Edition.

4. Digital Design, 3rd Edition, Moris M. Mano, Pearson Education.Page 18

PCEC7202 Digital Electronics Circuit Lab

List of Experiments:

(Atleast 10 experiments should be done, Experiment No. 1 and 2 are compulsory and out of the

balance 8 experiments atleast 3 experiments has to be implemented through both Verilog/VHDL

and hardware implementation as per choice of the student totaling to 6 and the rest 2 can be

either through Verilog/VHDL or hardware implementation.)

1.

Digital Logic Gates: Investigate logic behavior of AND, OR, NAND, NOR, EX-OR, EX-NOR,

Invert and Buffer gates, use of Universal NAND Gate.

2.

Gate-level minimization: Two level and multi level implementation of Boolean functions.

3.

Combinational Circuits: design, assemble and test: adders and subtractors, code converters,

gray code to binary and 7 segment display.

4.

Design, implement and test a given design example with (i) NAND Gates only (ii) NOR Gates

only and (iii) using minimum number of Gates.

5.

Design with multiplexers and de-multiplexers.

6.

Flip-Flop: assemble, test and investigate operation of SR, D & J-K flip-flops.

7.

Shift Registers: Design and investigate the operation of all types of shift registers with parallel

load.

8.

Counters: Design, assemble and test various ripple and synchronous counters - decimal counter,

Binary counter with parallel load.

9.

Memory Unit: Investigate the behaviour of RAM unit and its storage capacity – 16 X 4 RAM:

testing, simulating and memory expansion.

10. Clock-pulse generator: design, implement and test.

11. Parallel adder and accumulator: design, implement and test.

12. Binary Multiplier: design and implement a circuit that multiplies 4-bit unsigned numbers to

produce a 8-bit product.

13. Verilog/VHDL simulation and implementation of Experiments listed at Sl. No. 3 to 12.Page 19

PCCS7203 Design and Analysis of Algorithms Lab

1. Using a stack of characters, convert an infix string to postfix string.(1 class)

2. Implement insertion, deletion, searching of a BST. (1 class)

3. (a) Implement binary search and linear search in a program

(b) Implement a heap sort using a max heap.

4. (a) Implement DFS/ BFS for a connected graph.

(b) Implement Dijkstra's shortest path algorithm using BFS.

5. (a) Write a program to implement Huffman's algorithm.

(b) Implement MST using Kruskal/Prim algorithm.

6. (a) Write a program on Quick sort algorithm.

(b) Write a program on merge sort algorithm.

Take different input instances for both the algorithm and show the running time.

7.

Implement Strassen's matrix multiplication algorithm.

8. Write down a program to find out a solution for 0 / 1 Knapsack problem.

9. Using dynamic programming implement LCS.

10. (a) Find out the solution to the N-Queen problem.

(b) Implement back tracking using game trees.

PCCS7204 Database Engg. Lab

1. Use of SQL syntax: insertion, deletion, join, updation using SQL. (1 class)

2. Programs on join statements and SQL queries including where clause. (1 class)

3. Programs on procedures and functions. (1 class)

4. Programs on database triggers. (1 class)

5. Programs on packages. (1 class)

6. Programs on data recovery using check point technique. (1 class)

7. Concurrency control problem using lock operations. (1 class)

8. Programs on ODBC using either VB or VC++. (1 class)

9. Programs on JDBC. (1 class)

10. Programs on embedded SQL using C / C++ as host language. (1 class)

BIJU PATNAIK UNIVERSITY OF TECHNOLOGY,

ORISSA

INFORMATION TECHNOLOGY (IT)

5th Semester

6th Semester

Theory

Contact Hours

Theory

Contact

Hours

Code

Subject

L-T-P Credit

Code

Subject

L-T-P Credit

HSSM3301

HSSM3302

Principles of Management

OR

Optimization Engineering

3-0-0 3

HSSM3302

HSSM3301

Optimization Engineering

OR

Principles of Management

3-0-0 3

PCCS4302 Data Communication &

Computer Network

3-0-0 3

PCIT4301

Internet & Web Technology

3-0-0 3

PCCS4301 Computer Organization

3-0-0 3

PCCS4304 Operating Systems

3-0-0 3

PCIT4303 Java Programming

3-0-0 3

PCIT4302

Software Engineering

3-0-0 3

Professional Elective-I (Any one)

3-0-0 3

Professional Elective-II(Any one)

3-0-0 3

PECS5302 Principles of Programming

Languages

PCEL4303 M icroprocessor & Microcontrollers

PECS5304 Theory of Computation

PEIT5301

E-Commerce

PEIT5302 Data Mining & Data Warehousing

PCCS4305 Compiler Design

Free Elective-I (Any one)

3-0-0 3

Free Elective-II (Any one)

3-0-0 3

PCBM4302

PCEC4302

PCEC4303

Signals & Systems

Analog Communication Techniques

Control System Engineering

PCEC4305

PCEE4304

PEME5305

PEEE5301

Digital Communication Techniques

Communication Engineering

Robotics & Robot Applications

Optoelectronics Devices and Instrumentation

Theory Credits 18

Theory Credits

18

Practical/Sessional

Practical/Sessional

PCCS7301 Computer Organization Lab

0-0-3 2

PCIT7301 Internet & Web Technology Lab

0-0-3 2

PCCS7302 Computer Network Lab

0-0-3 2

PCCS7304 Operating Systems 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 Page 21

5

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Semester

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.

1. Modern Business Organisation & Management by Sherlekar, Himalaya

Publishing House. Page 22

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.

Unconstraint 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. Page 23

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 Page 24

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 NewDelhi.

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, Heuring

Willey India, 1st Edition. Page 25

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 Exiting 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 Handing: 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, 8

th

Edition Page 26

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. Page 27

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 Griebach 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.Page 28

PEIT5302 DATA MINING & DATA WAREHOUSING (3-0-0)

Module - I

12 Hours

Overview: Data warehousing, The compelling need for data warehousing, the

Building blocks of data warehouse, data warehouses and data marts, overview of the

components, metadata in the data warehouse, trends In data warehousing,

emergence of standards, OLAP, web enabled data warehouse, Introduction to the data warehouse project, understanding data warehousing Architecture, Data warehousing implementation, from data warehousing to data mining.

Module - II

14 Hours

Introduction to Data mining, Data mining Functionalities, Data preprocessing (data summarization, data cleaning, data integration and transformation, data reduction, data discretization),

Mining frequent patterns, associations, correlations (market basket analysis, the apriori algorithm, mining various kinds of association rules, from association mining to correlation analysis)

Classification: classification by decision tree induction, Rule based classification, classification by neural networks, classification by genetic algorithm

Module - III

10 Hours

Cluster Analysis: types of data in cluster analysis, A categorization of major clustering methods(partitioning methods, hierarchical methods),clustering high dimensional data, outlier analysis

Advanced techniques: web mining, spatial mining, temporal mining, Data mining applications in (financial data Analysis, retail industry, telecommunication industry, Biological data analysis, intrusion detection, in other scientific applications)

Text Books:

1. Data warehousing Fundamentals: Paulraj Ponniah, Willey India.

2. Data Mining: Concepts and techniques: J.Han and M.Camber, Elsevier.

Reference books:

1. Data Mining: Arun Pujari, University Press

2. Data Mining –a Tutorial based primer by R.J.Roiger, M.W.Geatz, Pearson

Education.

3. Data Mining & Data Warehousing Using OLAP: Berson, TMH.

4. Data Warehousing: Reema Thareja, Oxford University Press Page 29

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 Page 30

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, OxfordPage 31

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 Acceloroments, Retational systems, Gear Trains,

Electrical Systems, Analogy between Mechanical and electrical quanties, 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 Gensalised 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, Releative 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 Mcircles, 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.Page 32

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 Page 33

6

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Semester

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 Page 34

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, PearsonPage 35

SOFTWARE ENGINEERING

Module –I

(Lecture Hour 12)

Process Models: Software Processes, Software Development Life Cycle Models,

Waterfall Model, 'V' Model, Prototyping Model, The Iterative Waterfall Model, The Spiral

Model

Software Requirement Engineering:Requirement Engineering Process, Requirement

Inception, Identification of Stakeholders, Requirement, Requirement Elaboration: User

Requirements, Initial Technical Requirements, Final Functional Requirements,

Negotiation, Requirement

Structured Analysis & Design: Introduction to Structured Analysis, Data Flow

Diagram, Process Specification, Entity Relationship Model, Structured Design

Methodologies: Coupling and Cohesion, Structure Chart, Mapping DFD into Structure

Chart

Module –II

(Lecture Hour 12)

Object Oriented Concepts & Principles: Key OO Concepts: Object, Class, Message,

Inheritance, Abstraction, Encapsulation, Polymorphism, Relationships: Is-A

Relationship, Has-A Relationship, Uses-A Relationship

Modelling Techniques: Booch OO Design Model, Rumbaugh's Object Modelling

Technique, Jacobson's model, The Unified Approach to Modelling, Unified Modelling

Language

Object Oriented Analysis & Design: Use-Case Modelling, Use-Case Realization,

Types of Classes: Class Classification Approaches: Noun Phrase Approach, CRC Card

Approach, Use-case Driven Approach

Identification of Classes, Relationship, Attributes and Method

System Context and Architectural Design, Defining System Boundary, Identification of

Subsystems, Principles of Class Design, Types of Design Classes

UML diagrams: Class diagram, Object diagram, Activity diagram, State diagram,

Interaction diagrams, Sequence diagram, Collaboration Diagram, Component Diagram,

Deployment Diagram, Patterns

Module –III

(Lecture Hour 11)

Software Testing: Testing Fundamentals, Verification & Validation, Black Box Testing,

White Box Testing, Unit Testing, Integration Testing, Object Oriented Testing, System

Testing, Usability Testing

Software Metrics- Software Metrics and its Classification, Software Size Metrics: LOC

Metrics, Function Point Metrics, Feature Point Metrics, Bang Metrics, Halstead's Metrics

Quality Metrics, Process Metrics, Design Metrics: High Level Design Metrics,

Component Level Design Metrics

Object Oriented Metrics: CK Metrics Suite, Metrics for Object Oriented Design (MOOD)

Project Estimation Techniques, COCOMO Model: Basic COCOMO Model, Intermediate

COCOMO model, Complete COCOMO model, COCOMO II

Web Engineering: General Web Characteristics, Emergence of Web Engineering, Web

Engineering Process, Web Design Principles, Web Metrics

Textbooks

1. Software Engineering, Roger S Pressman, TMH

2. Fundamentals of Software Engineering, Rajib Mall, PHI

Reference Books

1. Software Engineering, Sommerville, Pearson

2. Software Engineering Fundamentals, Behforooz & Hudson, Oxford Page 36

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, Page 37

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, Pogramming 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. Rafiqzzaman, 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

PearsonPage 38

PEIT5301 E-COMMERCE

Module –I (Lecture Hour 11)

Basics of E-commerce

Basic Elements, of e-commerce, e-commerce framework, basic infrastructure for e-

commerce: Technical, capital, media, Human Resource, Public policy

Technical Infrastructure

Internet connectivity, protocols, web server, software for web server, e-commerce

software, security threats to e-commerce, protecting e-commerce system

Module –II (Lecture Hour 12)

Payment System for E-commerce

Online payments system, pre-paid and post-paid electronic payment systems,

Electronic data interchange (EDI)

Business Models for E-commerce

Revenue Model, Business model based on strategies, Marketing on the web:

Internet based Advertisement, Website usability, consumer oriented e-commerce

Module –III (Lecture Hour 12)

Internet Business Strategies

Electronic marketplaces, Electronic Auctions, Mobile Commerce, Virtual

Communities

Textbooks

1. Ecommerce, Gary P. Schneider, Cengage Learning

2. Electronic Commerce: Framework Technologies & Applications, Bharat Bhasker,

TMH

Reference Books

1. Electronic Commerce: A Manager's Guide, Kalakota & Whinston, Pearson

2. E-commerce, Jibitesh Mishra, Macmillan

3. E-commerce: Concepts, models & strategies, C.V.S Murthy, Himalaya

Publishing Page 39

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

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",5

th

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 Page 41

PCEE4304 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 Page 42

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 Page 43

PEEE5301 OPTOELECTRONICS DEVICES AND

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. Page 44

INTERNET & WEB TECHNOLOGY LAB (0-0-3)

1. Introduction to major internet protocol- SFTP

2. HTML- Basics of HTML., text, image, other MIME types, lists, tables, HTTP

methods, forms.

3. Multimedia on the Web- Embeddig audio and video files in HTML

4. Java Script- Introduction to Java Script for client side validation.

5. Serves side scripting – Introduction to fundamentals concepts of ASP or JSP

or PHP (any one platform depending on instructor). Basics of CGI scripting

using Perl or C. Simple examples of request/ response objects. Basic

introduction to web solutions architecture.

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.(Dinning

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.

**********Page 45

BIJU PATNAIK UNIVERSITY OF TECHNOLOGY,

ORISSA

INFORMATION TECHNOLOGY (IT)

7

th

Semester

8

th

Semester

Theory

Contact

Hours

Theory

Contact Hours						
Code	Subject	L-T-P	Credit	Code	Subject	L-T-P Credit
HSSM3401	Entrepreneurship Development	3-0-0	3	HSSM3402	Environmental Engineering	3-0-0 3
PCIT4401	Principles of Soft Computing	3-0-0	3			
PCIT4402	Software Project Management	3-0-0	3			
	Professional Elective-III (Any one)				ENTREPRENEURSHIP DEVELOPMENT	3-0-0 3
	Professional Elective-V(Any one)					

3-0-0

3

PECS5401 Artificial Intelligence

PECS5407

Wireless Sensor Networks

PECS5403 Real Time Systems

PECS5406

Digital Image Processing

PEIT5401 Software Testing

PECS5408

Embedded System Development

Professional Elective-IV (Any one)

Professional Elective-VI(Any one)

3-0-0

3

PECS5402 Cryptography & Network Security

PEIT5402

Ubiquitous Computing

PCCS4401 Computer Graphics

PECS5410

Algorithm for Bio-Informatics

PECS5404 Advanced Computer Architecture

PEIT5403

Multimedia Systems

3-0-0

3

Free Elective-III (Any one)

PEEC5418

FECS6401 Introduction to Digital Signal Processing

PEEI5405

Free Elective-IV (Any One)

Satellite Comm. Systems

MEMS

PCEC4401 VLSI Design

PCBM4402 Medical Imaging Techniques

PEEC5417 Digital Switching & Telecommunication

Networks

3-0-0

3

PEEC5416 Biomedical Instrumentation

3-0-0

3

PEEI5404

PEME5407

Free Elective-V (Any One)

Analog VLSI Design

Mechatronics

Industrial Instrumentation

PEEI5403

Theory Credits

18

Theory Credits

15

Practical / Sessional

Practical / Sessional

PCIT7401 Minor Project

3 PCIT7403

Major Project

6

PCIT7402 Seminar

2 PCIT7404

Comprehensive Viva voce

2

Practical/Sessional Credits 5

Practical/Sessional Credits

8

TOTAL SEMESTER CREDITS 23

TOTAL SEMESTER CREDITS 23

TOTAL CUMULATIVE CREDITS 181

TOTAL CUMULATIVE CREDITS 204 Page 46

Module I:

Understanding Entrepreneurship

10Hrs

Concept of Entrepreneurship, Motivation for Economic Development and

Entrepreneurial Achievement, Enterprise and Society

Why and how to start Business – Entrepreneurial traits and skills, Mind

Vrs Money in Commencing New Ventures, Entrepreneurial success and

failures, Environmental dynamics and change.

Entrepreneurial Process

Step by step approach to entrepreneurial start up

Decision for Entrepreneurial start up.

Module II: Setting up of a small Business Enterprise. 10Hrs

Identifying the Business opportunity - Business opportunities in various

sectors, formalities for setting up small enterprises in manufacturing and

services, Environmental pollution and allied regulatory and non-

regulatory clearances for new venture promotion in SME sector.

Writing a Business plan, components of a B-Plan, determining Bankability

of the project.

Module III: Institutional Support for SME.

10Hrs

Central / State level Institution promoting SME.

Financial Management in small business.

Marketing Management, problems & strategies

Problems of HRM – Relevant Labour – laws.

Sickness in Small Enterprises.

Causes and symptoms of sickness – cures of sickness.

Govt. policies on revival of sickness and remedial measures.

Reference Books:

1. Entrepreneurship Development, Small Business Enterprises, Chavantimath,

Pearson.

2. Entrepreneurial Development, S.S. Khanka, S Chand

3. Entrepreneurship, Barringer BR, Ireland R.D., Pearson

4. Entrepreneurship, David H Holt, PHI

5. Entrepreneurship, Kurilko, D.F. and Attodgets RM, Cengage

6. The Dynamics of Entrepreneurial Development & Management, Vasant Desai,

HPH.

7. Entrepreneurship, Roy, Oxford

8. Entrepreneurship, Hisrich, Peters, Shepherd, TMH Page 47

PRINCIPLES OF SOFT COMPUTING (3-0-0)

Module - I (12 Hrs.)

Introduction to Soft Computing, Artificial Neural Network(ANN) : Fundamentals of ANN,

Basic Models of an artificial Neuron, Neural Network Architecture, Learning methods,

Terminologies of ANN, Hebb network, Supervised Learning Networks: Perceptron,

MLP, Architecture of a Back propagation Network : back propagation, Learning Effect of

Tunning parameters of the Back propagation, Adaline, Madaline, RBF Network,

Associative memory: Auto, hetero and linear associative memory, network, Adaptive

Resonance Theory

ART1, ART2, Applications

Module –II (12 Hrs)

FUZZY LOGIC

Fuzzy set theory: crisp sets, fuzzy sets, crisp relations, fuzzy relations, Fuzzy Systems:

Crisp logic predicate logic, fuzzy logic, fuzzy Rule based system, Defuzzification

Methods, Fuzzy rule based reasoning

GENETIC ALGORITHMS

Fundamentals of genetic algorithms: Encoding, Fitness functions, Reproduction.

Genetic Modeling :

Cross cover, Inversion and deletion, Mutation operator, Bit-wise operators, Bitwise operators used in GA. Convergence of Genetic algorithm. Applications , Real life Problems.

Module – III (6 Hrs.)

Hybrid Soft Computing Techniques Hybrid system, neural Networks, fuzzy logic and Genetic algorithms hybrids. Genetic Algorithm based Back propagation Networks: GA based weight determination applications: Fuzzy logic controlled genetic Algorithms soft computing tools, Applications.

Text Book :

Principles of Soft Computing- S.N.Sivanandan and S.N.Deepa, Wiley India, 2nd Edition,2011

Reference Book :

1. Neuro Fuzzy and Soft Computing, J. S. R. JANG,C.T. Sun, E. Mitzutani, PHI

2. Neural Networks, Fuzzy Logic, and Genetic Algorithm (synthesis and Application) S.Rajasekaran, G.A. Vijayalakshmi Pai, PHI Page 48

SOFTWARE PROJECT MANAGEMENT

Module I: Project Evaluation and Planning

(12Hrs)

Activities in Software Project Management, Overview Of Project Planning, Stepwise planning, contract management, Software processes and process models. Cost Benefit Analysis, Cash Flow Forecasting, Cost-Benefit Evaluation Techniques, Risk Evaluation.

Project costing, COCOMO 2, Staffing pattern, Effect of schedule compression, Putnam's equation, Capers Jones estimating rules of thumb, Project Sequencing and Scheduling Activities, Scheduling resources, Critical path analysis, Network Planning, Risk Management, Nature and Types of Risks, Managing Risks, Hazard Identification, Hazard Analysis, Risk Planning and Control, PERT and Monte Carlo Simulation techniques.

Module 2: Monitoring And Control

(8Hrs)

Collecting Data, Visualizing Progress, Cost Monitoring, review techniques, project termination review, Earned Value analysis, Change Control, Software Configuration Management (SCM), Managing Contracts, Types Of Contracts, Stages In Contract Placement, Typical Terms of A Contract, Contract Management and Acceptance.

Module 3: Quality Management and People Management

(10Hrs)

Introduction, Understanding Behavior, Organizational Behaviour, Selecting The Right Person For The Job, Motivation, The Oldman – Hackman Job Characteristics Model , Working in Groups, Organization and team structures, Decision Making, Leadership, Organizational Structures, Stress, Health And Safety. ISO and CMMI models, Testing, and Software reliability, test automation, Overview of project management tools.

Text Book

1. Bob Hughes, Mike Cotterell, "Software Project Management", Fifth Edition, Tata McGraw Hill, 2011.

References:

1. Royce, "Software Project Management", Pearson Education, 1999.

2. Robert K. Wysocki, Effective Software Project Management, Wiley, 2009. Page 49

ARTIFICIAL INTELLIGENCE

Module 1

12Hrs

What is Artificial Intelligence? AI Technique, Level of the Model,Problem Spaces, and Search: Defining the Problem as a State Space Search, Production Systems, Problem Characteristics, Production System Characteristics, Issues in the Design of Search Programs.Heuristic Search Techniques: Generate-and-Test, Hill Climbing, Best-first Search, Problem Reduction, Constraint Satisfaction, Means-ends Analysis,Knowledge Representation: Representations and Mappings, Approaches to Knowledge Representation, Using Predicate Logic: Representing Simple Facts in Logic, Representing Instance and ISA Relationships, Computable Functions and Predicates, Resolution, Natural Deduction.Using Rules: Procedural Versus Declarative Knowledge, Logic Programming, Forward Versus Backward Reasoning, Matching, Control Knowledge.Symbolic Reasoning Under Uncertainty: Introduction to Nonmonotonic Reasoning, Logics for Nonmonotonic Reasoning, Implementation Issues, Augmenting a Problem-solver, Depth-first Search, Breadth-first Search.Weak and Strong Slot-and-Filler Structures: Semantic Nets, Frames, Conceptual DependencyScripts, CYC.

Module 2

10Hrs

Game Playing: The Minimax Search Procedure, Adding Alpha-beta Cutoffs, Iterative Deepening.Planning: The Blocks World, Components of a Planning System, Goal Stack Planning, Nonlinear Planning Using Constraint Posting, Hierarchical PlanningOther Planning Techniques.Understanding: What is Understanding, What

Makes Understanding Hard?, Understanding as Constraint Satisfaction.Natural

Language Processing: Introduction, Syntactic Processing, Semantic Analysis,

Discourse and Pragmatic Processing, Statistical Natural Language Processing, Spell

Checking.

Module 3

8Hrs

Learning: Rote Learning, Learning by Taking Advice, Learning in Problem-solving,

Learning from Examples: Induction, Explanation-based Learning, Discovery, Analogy,

Formal Learning Theory, Neural Net Learning and Genetic Learning. Expert Systems:

Representing and Using Domain Knowledge, Expert System Shells, Explanation,

Knowledge Acquisition.

Text Book:

1. Elaine Rich, Kevin Knight, & Shivashankar B Nair, Artificial Intelligence, McGraw

Hill, 3rd ed.,2009

References:

1) Introduction to Artificial Intelligence & Expert Systems, Dan W Patterson,

PHI.,2010

2) S Kaushik, Artificial Intelligence, Cengage Learning, 1st ed.2011 Page 50

REAL-TIME SYSTEMS

MODULE-1

10Hrs

Introduction: What is real time, Applications of Real-Time systems, A basic model of

Real-time system, Characteistics of Real-time system, Safety and Reliability, Types of

Real-time tasks, timing constraints, Modelling timing constraints

Real-Time Task Scheduling: Some important concepts, Types of Real-time tasks and their characteristics, Task scheduling, Clock-Driven scheduling, Hybrid schedulers, Event-Driven scheduling, Earliest Deadline First (EDF) scheduling, Rate monotonic algorithm (RMA). Some issues Associated with RMA. Issues in using RMA practical situations.

MODULE-2

10Hrs

Handling Resource Sharing and dependencies among Real-time Tasks: Resource sharing among real-time tasks. Priority inversion. Priority Inheritance Protocol (PIP), Highest Locker Protocol (HLP). Priority Ceiling Protocol (PCP). Different types of priority inversions under PCP.Important features of PCP. Some issues in using a resource sharing protocol. Handling task dependencies.

Scheduling Real-time tasks in multiprocessor and distributed systems: Multiprocessor task allocation, Dynamic allocation of tasks. Fault tolerant scheduling of tasks. Clock in distributed Real-time systems, Centralized clock synchronization

MODULE-3

10Hrs

Commercial Real-time operating systems: Time services, Features of a Real-time operating system, Unix as a Real-time operating system, Unix-based Real-time operating systems, Windows as a Real-time operating system,POSIX-RT, A survey of contemporary Real-time operating systems. Benchmarking real-time systems.

Real-time Databases: Example applications of Real-time databases. Review of basic database concepts, Real-time databases, Characteristics of temporal data. Concurrency control in real-time databases. Commercial real-time databases. Real-time Communication: Basic concepts, Examples of applications, Real-time

communication in a LAN and Real-time communication over packet switched networks.

Text Book:

1. Real-time Systems Theory and Practice by Rajib Mall, Pearson Publication, 2008.

References:

1. Jane W. S. Liu, Real-Time Systems, Pearson Education, 2000.

2. C.M. Krishna and K.G. Shin, Real-Time Systems, TMH.Page 51

SOFTWARE TESTING

Module 1. Basics of Software Testing

The Testing process, Testing and Debugging; Test Metrics; Software and Hardware Testing; Testing and Verification; Defect Management; Execution History; Test case generation Strategies, Static and dynamic analysis., Model-Based Testing; Control-flow Graph, state-model, and data-flow-based testing.

Module 2. Test Generation and Regression Testing

Introduction; The Test-Selection Problem; Equivalence Partitioning; Boundary Value. Analysis; Category-Partition Method. Cause-Effect Graphing, Test Generation from Predicates. Combinatorial Designs; A Combinatorial Test-Design Process; Fault Model. Basics of Regression Testing (RTS), Selecting Regression Tests; Test Selection Using Execution Trace; Test Selection Using program slicing; Test Minimization; Test Prioritization; Tools for Regression Testing.

Module 3. Test Adequacy

Test Adequacy: Basics; Adequacy Criteria Based on Control Flow. Data-Flow Concepts; Adequacy Criteria Based on Data-Flow; Control Flow versus Data- Flow; The Subsumes Relation; Structural and Functional Testing; Scalability of Coverage Measurement.

Text Books:

1. Srinivasan Desikan, Gopalaswamy Ramesh: Software testing Principles and

Practices, 2nd Edition, Pearson, 2007.

Reference Books:

1. Aditya P Mathur: Foundations of Software Testing, Pearson Education, 2008.

2. Ron Patton: Software Testing, 2nd edition, Pearson, 2004.

3. Mauro Pezze and Michal Young. Software Testing and Analysis, Wiley, 2008.Page 52

CRYPTOGRAPHY AND NETWORK SECURITY

Module 1

10Hrs

Introduction to Information Security: Security Goals, Attacks, Security Services and

Mechanisms, Mathematical Background: Integer and Modular Arithmetic, Matrices,

Linear Congruence. Groups, Rings, and Fields, GF(p), Euclidean and Extended

Euclidean Algorithms, Polynomial Arithmetic, GF(2n). Random Number Generation,

Prime Numbers, Fermat's and Euler's Theorems, Primality Testing Methods,

Factorization, Chinese Remainder Theorem, Quadratic Congruence, Discrete

Logarithms.

Module 2

10Hrs

Traditional Encryption Methods: Symmetric Cipher Model, Substitution Ciphers,

Transposition Ciphers, Block and Stream Ciphers, Rotor Cipher, Steganography.

Symmetric Key Ciphers: Data Encryption Standard, Advanced Encryption Standard.

Asymmetric Key Ciphers: RSA Cryptosystem, ElGamal Cryptosystem, Elliptic Curve

Cryptosystem.Message Integrity, Authentication: Message Integrity, Random Oracle

Model, Message Authentication, MAC Algorithms. Cryptographic Hash Functions: MD

Hash Family, Whirlpool, Secure Hash Algorithm. Digital Signature and Authentication:

Digital Signature Schemes, Variations and Applications, Entity Authentication.Key

Management: Diffie-Hellman Key Exchange.

Module 3

10Hrs

Network and System Security:Security at the Application Layer: e-mail security, PGP

and S/MIME. Security at the Transport Layer: Secure Socket Layer (SSL) and

Transport Layer Security (TLS). Security at the Network Layer: IP Security. System

Security: Malicious Software, Malicious Programs, Viruses, Worms, Malware, Intrusion

Detection System, Firewalls.

Text Books:

1. B. A. Forouzan & D Mukhopadhyay ,Cryptography and Network Security.,

McGraw Hill, 2nd ed.2010

References:

1. B. Menezes ,Network Security and Cryptography., Cengage Learning, 1st ed.2010

2. Stallings ,Cryptography and Network Security., PHI, 4th ed.2010 Page 53

COMPUTER GRAPHICS

Module – I (10 hours)

Overview of Graphics System: Video Display Units, Raster-Scan and Random Scan

Systems, Graphics Input and Output Devices.

Output Primitives: Line drawing Algorithms: DDA and Bresenham's Line Algorithm,

Circle drawing Algorithms: Midpoint Circle Algorithm and Bresenham's Circle drawing

Algorithm.

Two Dimensional Geometric Transformation: Basic Transformation (Translation, rotation, Scaling) Matrix Representation, Composite Transformations, Reflection, Shear, Transformation between coordinate systems.

Two Dimensional Viewing: Window-to- View port Coordinate Transformation.

Module –II (12 hours)

Line Clipping (Cohen-Sutherland Algorithm) and Polygon Clipping (Sutherland-Hodgeman Algorithm).

Aliasing and Antialiasing, Half toning, Thresholding and Dithering, Scan conversion of Character.

Polygon Filling: Seed Fill Algorithm, Scan line Algorithm.

Two Dimensional Object Representation: Spline Representation, Bezier Curves and B-Spline Curves.

Fractal Geometry: Fractal Classification and Fractal Dimension.

Three Dimensional Geometric and Modeling Transformations: Translation Rotation, Scaling, Reflections, shear, Composite Transformation.

Projections: Parallel Projection and Perspective Projection.

Module –III (8 hours)

Visible Surface Detection Methods: Back-face Detection, Depth Buffer, A- Buffer, Scan-line Algorithm and Painters Algorithm.

Illumination Models: Basic Models, Displaying Light Intensities.

Surface Rendering Methods: Polygon Rendering Methods: Gouraud Shading and Phong Shading.

Computer Animation: Types of Animation, Key frame Vs. Procedural Animation, methods of controlling Animation, Morphing.

Virtual Reality: Types of Virtual reality systems, Input and Output Virtual Reality

devices.

Textbook

1. Computer Graphics with Virtual Reality System, Rajesh K.Maurya, Wiley-

Dreamtech.

2. Computer Graphics, D. Hearn and M.P. Baker (C Version), Pearson Education

Reference Books

1. Computer Graphics Principle and Practice , J.D. Foley, A.Dam, S.K. Feiner,

Addison, Wesley

2. Procedural Elements of Computer Graphics- David Rogers (TMH)

3. Computer Graphics: Algorithms and Implementations – D.P Mukherjee &

Debasish Jana (PHI)

4. Introduction to Computer Graphics & Multimedia – Anirban Mukhopadhyay &

Arup Chattopadhyay (Vikas) Page 54

ADVANCED COMPUTER ARCHITECTURE

Module 1: Processor Architecture

10Hrs

Evolution of Microprocessors, Instruction set processor design, Principles of processor

performance, Instruction-level Parallelism, RISC and CISC architectures, Pipelining

fundamentals, Arithmetic and instruction pipelining, Pipeline hazards, Minimizing

pipeline stalls, Branch Prediction, superscalar and superpipelined architectures.

Module 2: Memory and I/O Architecture

10Hrs

Hierarchical memory technology; Multi-level caches, Data and Instruction caches,

Cache optimizations, Memory Management hardware, I/O systems: Peripheral and

Processor-Memory buses, Split transaction buses , USB.

Module 3: Multiprocessor Architecture

10Hrs

Basic multiprocessor architecture, Cache coherence, multithreaded processors, VLIW

processor architectures. Array and vector processors. Case studies :MIPS

architecture, Intel Series of processors, Pentium's Internally RISC and externally CISC,

Hyper threading, SPARC and ARM processors.

Text Book

1. David A. Patterson and John L. Hennessy, Computer Organization and Design,

Elsevier, Fourth Edition

2. John Paul Shen and Mikko Lipasti, Modern Processor Design, Tata McGraw Hill.

References:

1. Dezso Sima, Terence Fountain, and Peter Kacsuk, Advanced Computer

Architecture: A Design Space Approach, by Addison Wesley

2. John L. Hennessy & David A. Patterson, Computer Architecture, A Quantitative

Approach 4th Edition, Morgan Kaufmann.

3. Hwang & Jotwani, Advance Computer Architecture, TMH Page 55

INTRODUCTION TO DIGITAL SIGNAL PROCESSING (3-0-0)

Module – I

(10 hours)

Discrete Time Signals and System

Discrete Time Signals (Elementary examples, classification : periodic and a periodic Signals

energy and Power signals, Even and Odd Signals) .

Discrete Time System :

Block diagram representation of discrete time systems, classification of discrete time systems – static and dynamic, time variant and time – invariant, linear and non-linear, casual and anti-casual, stable and unstable.

Analysis and response (convolution sum) of discrete - time linear LTI system, Recursive and Non-recursive discrete time system. Constant coefficient differences equations and their solutions, impulse response of LTI system , structures of LTI systems Recursive and Non-recursive realization of FIR system. Correlation of dispute time Signal.

Selected portions from Chapter 2 (2.1, 2.2,2.3,2.4,2.5, 2.6.1) of Textbook – I

Chapter 1 of Textbook- 2.

Module – II

(10 hours)

The Z transform

The Z-transform and one-sided Z-transform, properties of Z-transform , inverse of the Z-transform , Solution of difference equations.

Selected portions from Chapters 3 (3.1, 3.2,3.5) of Textbook – I

Selected portion of chapter 4 of Textbook - 2

The Discrete Fourier Transform

The DFT and IDFT, relationship , DFT with Z- transform , the DFT as a linear transformation Relationship of DFT with Z-transform , properties of DFT: periodicity, linearity, summery and time reversal of a sequence. Circular convolution, circular correlation, circular correction by convolution, method linear convolution by overlap save methods and by overlap add method, Circular convolution and correlation by DFT method, Overlap add and save filtering by DFT method.

Selected portion from Chapter – 5 (5.1.2,5.1.3,5.1.4,5.2,5.2.1,5.2.2, 5.2.3, 5.3.2) of textbook –1.

Selected portion of chapter 6 of textbook - 2.

Module- III

(10 hours)

Fast Fourier Transform :

Operation counts by direct copulation of DFT, Radix – 2 FFT algorithm- Decimation –in-time

(DIT) and Decimation – in frequency (DIF) algorithm, Efficient computation DFT of Two real

sequences , Efficient Computation of DFT of a 2 N-pt real sequences.

Selected portions from chapter 6 (6.1.1,6.1.3, 6.2.1, 6.2.2) of Text book –I

Selected portions from chapter 7 and 8 of Text book – 2.

Design and Digital Filters:

Casually and its implication, Design of linear phase FIR filters using different windows. Design

of IIR filters – Impulse Invariance Method and Bilinear transformation method.

Selected portions from chapter 8 (8.1.1, 8.2.1, 8.2.2., 8.3.2,8.3.3.) 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 : Page 56

VLSI DESIGN

Module – I

08 Hours

Introduction: Historical Perspective, VLSI Design Methodologies, VLSI Design Flow, Design

Hierarchy, Concept of Regularity, Modularity and Locality, VLSI Design Styles, Computer-Aided

Design Technology.

Fabrication of MOSFETs: Introduction, Fabrication Processes Flow – Basic Concepts, The

CMOS n-Well Process, Layout Design Rules, Stick Diagrams, Full-Customs Mask Layout

Design.

MOS Transistor: The Metal Oxide Semiconductor (MOS) Structure, The MOS System under External Bias, Structure and Operation of MOS Transistor (MOSFET), MOSFET Current-Voltage Characteristics, MOSFET Scaling and Small-Geometry Effects, MOSFET Capacitance.

(Chapter 1 to 3 of Text Book 1 and for Stick Diagram Text Book 2)

Module – II

14 Hours

MOS Inverters – Static Characteristics: Introduction, Resistive-Load Inverters, Inverters with n-Type MOSFET Load, CMOS Inverter.

MOS Inverters – Switching Characteristics and Interconnect Effects: Introduction, Delay-Time Definitions, Calculation of Delay-Times, Inverter Design with Delay Constraints, Estimation of Interconnect Parasitics, Calculation of Interconnect Delay, Switching Power Dissipation of CMOS Inverters.

Combinational MOS Logic Circuits: Introduction, MOS Logic Circuits with Depletion nMOS Loads, CMOS Logic Circuits, Complex Logic Circuits, CMOS Transmission Gates (Pass Gates).

(Chapter 5 to 7 of Text Book 1)

Module – III

18 Hours

Sequential MOS Logic Circuits: Introduction, Behaviour of Bistable Elements, SR Latch Circuits, Clocked Latch and Flip-Flop Circuits, CMOS D-Latch and Edge-Triggered Flip-Flop.

Dynamic Logic Circuits: Introduction, Basic Principles of Pass Transistor Circuits, Voltage Bootstrapping, Synchronous Dynamic Circuit Techniques, Dynamic CMOS Circuit Techniques, High Performance Dynamic CMOS Circuits.

Semiconductor Memories: Introduction, Dynamic Random Access Memory (DRAM), Static

Random Access Memory (SRAM), Non-volatile Memory, Flash Memory.

Design for Testability: Introduction, Fault Types and Models, Ad Hoc Testable Design

Techniques, Scan-Based Techniques, Built-In Self-Test (BIST) Techniques, Current Monitoring

IDDQ Test.

Text Books:

1. Sung-Mo Kang and Yusuf Leblebici, CMOS Digital Integrated Circuits: Analysis and

Design, 3rd Edn., Tata McGraw-Hill Publishing Company Limited, 2003.

2. K. Eshraghian and N.H.E. Weste, Principles of CMOS VLSI Design – a Systems

Perspective, 2nd Edn., Addison Wesley, 1993.

Reference Books:

1. Jan M. Rabaey, Anantha Chandrakasan, Borivoje Nikolic, Digital Integrated Circuits – A

Design Perspective, 2nd Edn., PHI.

2. Wayne Wolf, Modern VLSI Design System – on – Chip Design, 3rd Edn., PHI

3. Debaprasad Das, VLSI Design, Oxford University Press, New Delhi, 2010.

4. John P. Uyemura, CMOS Logic Circuit Design, Springer (Kluwer Academic Publishers),

2001.

5. Ken Martin, Digital Integrated Circuit Design, Oxford University Press, 2000. Page 57

DIGITAL SWITCHING AND TELECOMUNICATION

NETWORKS

MODULE – I

(16 hours)

Introduction:

Fundamentals of switching system, telecommunication networks.

Electronic space division switching: Stored program control, centralized and

distributed SPC, application software architecture, enhanced services, two and three

stage

&

n

stage

networks.

Time Division Switching: Basic time division space switching, time division time

switching, time multiplexed space and time switching, combination switching, three-

stage & n stge combination switching. (Chapter 1, 4 and 6)

MODULE – II

(12 hours)

Traffic Engineering: Network traffic load and parameters, Grade of services &

blocking probability, modeling of switching systems, incoming traffic & service time

characterization, blocking models and loss estimates, Delay systems (Chapter 8)

Telephone Networks: Subscriber loop systems, switching hierarchy and routing,

transmission plan, transmission systems, Signaling techniques : in channel & common

channel signaling (Chapter 9)

MODULE – III

(12 hours)

Data Networks: Data transmission in PSTN, switching techniques, Data

communication architecture, link-to-link layers, end-to-end layers, satellite based data

networks, an overview of data network standards. (Chapter 10)

Integrated Service Digital Network: Motivation, new services, transmission channels,

signalling, service characterization, ISDN standards, broad band ISDN, voice data

integration (Chapter 11)

Text Books :

1. Thiagarajan Viswanathan, Telecommunication Switching Systems and Networks

by, PHI Learning Pvt. Ltd., New Delhi.

References:

1. Communication Networks, A Leon-Garcia and Indra Widiaja, TMH, New Delhi

2. Data and Computer Communications by W Stallings, Pearson Education Page 58

BIOMEDICAL INSTRUMENTATION (3-0-0)

Module – I

(10 Hours)

Fundamentals of Biomedical Instrumentation: Sources of Biomedical Signals, Basic

Medical Instrumentation System, Intelligent Medical Instrumentation Systems, PC

Based Medical Instrumentation Systems, General Constraints & Regulations of Medical

Devices

Biomedical Signals & Electrodes: Origin of Bioelectric Signals-Repolarization,

Depolarization, Resting Potential Recording Electrodes – Ag-AgCl Electrodes,

Electrodes for ECG, EEG, EMG, Microelectrodes, Skin Contact Impedance, Motion

Artifacts

Module – II

(13 Hours)

Physiological Transducers: Introduction to Physiological Transducers, Classification

of Transducers, Pressure Transducers, Transducers for Body Temperature

Measurement, Biosensors, Smart Sensors

Biomedical Recording Systems: Basic Recording Systems, General Considerations

for Signal Conditioners, Biomedical Signal Analysis Techniques, Signal Processing

Techniques, Writing Systems: Direct Writing Recorders, Inkjet Recorder, Potentiometric

Recorders, Digital Recorders

Biomedical

Recorders:

Electrocardiograph

(ECG),

Phonocardiograph,

Electroencephalograph (EEG), Electromayograph (EMG)

Module – III

(14 Hours)

Patient Monitoring Systems: System Concepts, Measurement of Heart Rate, Blood

Pressure Measurement, Measurement of Respiration Rate

Blood Flow meters: Electromagnetic Blood Flow meter, Ultrasonic Blood Flow meter,

NMR Blood Flow meter, Laser-Doppler Blood Flow meter

Patient Safety: Electric Shock Hazards, Leakage Currents, Safety Codes for

Biomedical Equipment

Text Books:

1. Hand Book of Biomedical Instrumentation-2nd Edition by R.S.Khandpur, Tata

McGraw Hill 2003 (Chapters 1-6,11,18)

2. Biomedical Instrumentation and Measurements-2nd Edition by Leslie Cromwell,

Fred J. Weibell, Erich A. Pfeiffer, PHI learning Pvt Ltd 2nd Edition

Reference Books:

1. Introduction to Biomedical Equipment Technology-4th Edition by Joseph J. Carr,

John M. Brown, Pearson Education 2007

8

ENVIRONMENTAL ENGINEERING (3-0-0)

Objective: This course introduces the students to the environmental consequences of

Industries, development actions etc. and the methods of minimizing their impact

through technology and legal systems.

Module – I

Ecological Concepts and Natural Resources: Ecological perspective and value of

environment. Environmental auditing, Biotic components, Ecosystem Process: Energy,

Food Chain, Water cycle, Oxygen cycle, Nitrogen cycle etc., Environmental gradients,

Tolerance levels of environment factor, EU, US and Indian Environmental Law, Global

Perspective.

Chemistry in Environmental Engineering: Atmospheric chemistry, Soil chemistry,

Material balances and Reactor configurations.

Module – II

Water Pollution: water quality standards and parameters, Assessment of water quality,

Aquatic pollution, Estuarine water quality, Marine pollution, Organic content

parameters, Ground water Contamination, Water table and Aquifer, Ground water

recharge. Water quality parameter and standards.

Water Treatment: Water treatment processes, Pre-treatment of water, Conventional

process, Advanced water treatment process.

Waste Water Treatment: DO and BOD of Waste water treatment process, pretreatment,

primary and secondary treatment of waste water, Activated sludge treatment:

Anaerobic digestion and its microbiology, Reactor configurations and methane

production. Application of anaerobic digestion.

Air Pollution : Air pollution and pollutants, criteria pollutants, Acid deposition, Global climate change –green house gases, non-criteria pollutants, emission standard form industrial sources, air pollution metereology, Atmospheric dispersion.

Industrial Air Emission Control:

Characterization of air stream, Equipment selection, Equipment design, Special Methods: Flue gas desulphurization, NOx removal, Fugitive emissions.

Module – III

Solid Waste Management Source classification and composition of MSW: properties and separation, storage and transportation, MSW Management, Waste minimization of MSW, Reuse and recycling,

Hazardous Waste Management, Hazardous waste and their generation, Transportation and treatment of hazardous waste: Incinerators, Inorganic waste treatment, handling of treatment plant residue. Waste minimization techniques.

Noise Pollution: Physical Properties of sound, Noise criteria, Noise Standards, Noise measurement, Noise control.

Environment impact Assessment, Origin and procedure of EIA, Project Screening for EIA, Scope studies, Preparation and review of EIS.

Text Book

1. Environmental Engineering Irwin/ McGraw Hill International Edition, 1997, G. Kiely,

2.Environmental Engineering & Safety by Prof B.K. Mohapatra, Seven Seas Publication,Cuttack

Reference Books

1. Environmental Engineering by Arcadio P. Sincero & Gergoria A.Sincero PHI Publication

2. Principles of Environmental Engineering and Science, M. L. Davis and S. J. Masen, McGraw

Hill International Edition, 2004

3. Environmental Science, Curringham & Saigo, TMH,

4. Man and Environment by Dash & Mishra

5. An Introduction to Environmental Engineering and Science by Gilbert M. Masters & Wendell

P. Ela - PHI Publication.

Unit I

8Hrs

Sensor Network Concept: Introduction, Networked wireless sensor devices,

Advantages of Sensor networks, Applications, Key design challenges.

Network deployment: Structured versus randomized deployment, Network topology,

Connectivity, Connectivity using power control, Coverage metrics, Mobile deployment.

Unit II

8Hrs

Localization and Tracking: Issues and approaches, Problem formulations: Sensing

model, collaborative localization. Coarse-grained and Fine-grained node localization.

Tracking multiple objects: State space decomposition.

Synchronization: Issues and Traditional approaches, Fine-grained clock

synchronization, and Coarse-grained data synchronization.

Unit III

14Hrs

Wireless Communications: Link quality, shadowing and fading effects

Medium-access and sleep scheduling: Traditional MAC protocols, Energy efficiency in

MAC protocols, Asynchronous sleep techniques, Sleep-scheduled techniques, and

Contention-free protocols.

Routing: Metric-based approaches, Multi-path routing, Lifetime-maximizing energy-aware routing techniques, Geographic routing.

Sensor network Databases: Data-centric routing, Data-gathering with compression, Querying, Data-centric storage and retrieval, the database perspective on sensor networks.

Security: Privacy issues, Attacks and countermeasures.

Text Books:

1. Wireless Sensor Networks: An Information Processing Approach- by Feng Zhao, Leonidas Guibas , Morgan Kaufmann Series in Networking 2004.

References Books:

1. Networking Wireless Sensors: Bhaskar Krismachari, Cambridge University Press

2. Wireless Sensor Networks: Edited by C.S Raghavendra, Krishna M, Sivalingam, Taieb Znati , Springer.

3. Wireless Sensor Networks: Technology, Protocols, and Applications: Kazem Sohraby, Daniel Minoli, Taieb Znati , Wiley Inter Science.

DIGITAL IMAGE PROCESSING Page 61

Module: 1

(12 hours)

Introduction: Digital Image fundamentals: Image sampling and quantization, relationship between pixels, Intensity transformations and spatial filtering, some basic intensity transformation functions, Histogram processing, spatial filters for smoothing and sharpening (Chapt: 2 & 3 of Text book 1)

Module: 2

(12 hours)

Filtering in the Frequency Domain: preliminary concepts, 2D DFT and its properties, basic filtering in the frequency domain, image smoothing and sharpening (Chapt: 4 of Text book 1)

Image Restoration and Reconstruction: Image restoration/degradation model, noise models, restoration in the presence of noise only, estimating the degradation function (Chapt: 5 of Text Book 1)

Module: 3

(12 hours)

Color Image Processing: color models, Color transformation (Chapt: 6 of Text book 1)

Wavelets and Multi-resolution Processing: multiresolution expansions, wavelet transforms in one and two dimension (Chapt: 7 of Text book 1)

Image Compression: Fundamentals, Some basic compression methods (Chapt: 8 of Text book 1)

Morphological Image Processing: Erosion and Dilation, opening and closing (Chapt: 9 of Text book 1)

Text Books:

1. R.C. Gonzalez, R.E. Woods, Digital Image Processing, 3rd Edition, Pearson Education

2. R C Gonzalez, Woods and Eddins, Digital Image Processing using Matlab, 2nd Edition, Tata McGraw Hill

Reference Books:

1. S.Sridhar, Digital Image Processing, Oxford University Press, 2011

EMBEDDED SYSTEM DEVELOPMENT

Module I Hardware Concepts

Application and characteristics of embedded systems, Overview of Processors and hardware units in an embedded system, General purpose processors, Microcontrollers, ARM-based Systems on a Chip (SoC), Application-Specific Circuits (ASICs), Levels of hardware modelling, VHDL, Sensors, A/D-D/A converters, Actuators, Interfacing using UART, USB, CAN bus, SRAM and DRAM, Flash memory.

Module II Real-Time Operating Systems

12Hrs

Real-Time Task Scheduling: Some important concepts, Types of real-time tasks and their characteristics, Task scheduling, Clock-Driven scheduling, Hybrid schedulers, Event-Driven scheduling, Earliest Deadline First (EDF) scheduling, Rate monotonic algorithm (RMA). Commercial Real-time operating systems: Time services, Features of a Real-time operating system, Unix-based Real-time operating systems, POSIX-RT, A survey of contemporary Real-time operating systems, Microkernel-based systems.

Module III Embedded Application Development 8Hrs

Embedded system development life cycle, State charts, General language characteristics , Features of MISRA C for embedded programming, Hardware/Software Co-design, Hardware/software partitioning, Testing embedded systems, Design for testability and Self-test.

TEXTBOOKS

1. Frank Vahid and Tony Givargis, Embedded Systems Design – A unified Hardware /Software Introduction, John Wiley, 2002. (For Module 1)

2. David E.Simon, An Embedded Software Primer, Pearson Education Asia, First Indian Reprint 2000. (For Modules 2 and 3)

REFERENCES

1. S. Chattopadhyay, Embedded System Design, PHI

2. Shibu KV, Introduction to Embedded Systems, TMH

3. Wayne Wolf, Computers as Components; Principles of Embedded Computing

System Design – Harcourt India, Morgan Kaufman Publishers, 2001

4. Rajkamal, Embedded Systems Architecture, Programming and Design, TATA

McGraw-Hill, 2003

UBIQUITOUS COMPUTING (3-0-0)Page 63

Module - I (12 hours)

Introduction: Three Tier Architecture Mobile Computing Architecture, Evolution of

Wireless Technology

Cellular System: Cell, Cluster, Cell Splitting, Frequency Reuse, Channel Assignment

Strategies, Components of Cellular System, Operation of Cellular System

Personal Communications Services (PCS): PCS Architecture, mobility management.

Global System for Mobile Communication (GSM): Overview, Architecture, Network

signaling, Channels, Mobility Management.

General Packet Radio Services (GPRS): Architecture, GPRS Interfaces, Network

Protocols

Module - II (12 hours)

Wireless LAN (WLAN): Application, Requirement, IEEE 802.11(Ad-hoc Mode,

Infrastructure Mode, Protocol Architecture), Bluetooth (Piconet, Scatternet, Protocol

Stack, Bluetooth Profile)

Wireless Application Protocol (WAP): WAP Gateway and Protocols, wireless mark

up Languages (WML),

Wireless Local Loop (WLL): WLL Configuration, Architecture, WLL Technologies.

IMT 2000: Vision, IMT-2000 Family, W-CDMA and CDMA 2000

Module - III (12 hours)

Satellite System: Introduction, Types of Satellite System (HEO, MEO, LEO), Satellite

System Architecture, Case Studies: IRIDIUM, GLOBALSTAR and ICO

Virtual Private Network (VPN): Features, Goals, Working, Remote Access VPN, Site

to Site VPN, VPN Protocols, Requirements

Mobile IP & Cellular IP: Goals & Working

Mobile OS: Windows CE, Windows Mobile OS, Symbian OS

Text Books

1. Mobile Computing- A.Talukdar(TMH)

2. Mobile Computing- P.K.Patra, S.K.Dash (SCITECH Publication)

3. Principle of Mobile Computing – Hansman (Springer)

Reference Books

1) Mobile Communication- Schiller (Pearson)

2) Mobile Computing – Raj Kamal (Oxford)

3) Wireless Communication – Rappaport (PHI)

ALGORITHMS FOR BIOINFORMATICS Page 64

Module 1

8Hrs

Introduction, Algorithms and Complexity: Biological Algorithms versus Computer

Algorithms, Notations, Algorithm Design Techniques, Tractable versus Intractable

Problems.

Molecular Biology Primer: Genes, Molecules, Structure of DNA, Proteins, Analysis.

Exhaustive Search: Restriction Mapping, Impractical Restriction Mapping Algorithms, A Practical Restriction Mapping Algorithm, Regulatory Motifs in DNA Sequences, Profiles, The Motif Finding Problem, Search Trees, Finding Motifs, Finding a Median String.

Module 2

8Hrs

Greedy Algorithms: Genome Rearrangements, Sorting by Reversals, Approximation Algorithms, Breakpoints: A Different Face of Greed, A Greedy Approach to Motif Finding. Dynamic Programming Algorithms: The Power of DNA Sequence Comparison, The Change Problem Revisited, The Manhattan Tourist Problem, Edit Distance and Alignments, Longest Common Subsequences, Global Sequence Alignment, Scoring Alignments, Local Sequence Alignment, Alignment with Gap Penalties, Multiple Alignment, Gene Prediction, Statistical Approaches to Gene Prediction, Similarity-Based Approaches to Gene Prediction, Spliced Alignment. Divide-and-Conquer Algorithms: Divide-and-Conquer Approach to Sorting, Space-Efficient Sequence Alignment, Block Alignment and the Four-Russians Speedup, Constructing Alignments in Subquadratic Time.

Module 3:

10Hrs

Graph Algorithms: Graphs and Genetics, DNA Sequencing, Shortest Superstring Problem, DNA Arrays as an Alternative Sequencing Technique, Sequencing by Hybridization, SBH as a Hamiltonian Path Problem, SBH as an Eulerian Path Problem, Fragment Assembly in DNA Sequencing, Protein Sequencing and Identification, The Peptide Sequencing Problem, Spectrum Graphs, Protein Identification via Database Search, Spectral Convolution, Spectral Alignment.

Combinatorial Pattern Matching: Repeat Finding, Hash Tables, Exact Pattern Matching, Keyword Trees, Suffix Trees, Heuristic Similarity Search Algorithms, Approximate Pattern Matching, BLAST: Comparing a Sequence against a Database.

Text Book: No Indian Print is available.

References:

1) Neil C. Jones and Pavel A. Pevzner, An Introduction to Bioinformatics Algorithms, MIT Press, 2004.

2) Bioinformatics Algorithms, Techniques & Applications – Wiley Inter Science

3) Wing-Kin Sung, "Algorithms in Bioinformatics: A Practical Introduction", CRC Press (Taylor & Francis Group), 2009.

4) Ion Mandoiu, Alexander Zelikovsky, Bioinformatics Algorithms: Techniques and Applications Wiley, 2008.

MULTIMEDIA SYSTEMSPage 65

Module – I (10 hours)

Definition and Main properties of Multimedia System, Traditional Data streams characteristics, Characteristics of continuous media data based on time, space and continuity.

Sound/Audio: Basic sound concepts, MIDI devices and MIDI messages. Image: Digital image representation, Image Format, Graphics format, Computer Image Processing: Image Synthesis, Image Analysis and Image Transmission. Video: Video Signal Representation, Computer Video format, Television

Module –II (12 hours)

Data Compression: Source, Entropy and Hybrid Encoding, Some basic compression techniques, JPEG, MPEG, H.261, DVI.

Multimedia Operating Systems: Process Management-Realtime Scheduling System

Model, Rate Monotonic & Earliest Deadline First Algorithm, Process Utilization,

Multimedia File System Paradigm, Disk Scheduling.

Multimedia Communication Systems: Application Subsystem, Transport Subsystem,

QOS and Resource Management.

Synchronization: Notion of Synchronization, Presentation Requirements, Reference

model for Multimedia Synchronization, Synchronization Specification.

Module –III (10 hours)

Multimedia Authoring Tools, Multimedia Systems Frameworks: Multimedia Information

System: Multimedia Information Model and Multimedia Distributed Processing Model.

Multimedia Communication System: Multimedia Conferencing Model and Multimedia

Network Model. QOS layer Architecture, Distributed Multimedia Systems: Features of

Distributed Multimedia System, Types of Distributed Multimedia Application, QOS in

Distributed Multimedia System.

Textbook

1) Multimedia: Computing, Communications & Applications, Ralf Steinmetz and

Klara Nahrstedt, Pearson Education.

2) Multimedia Systems, P.K.Buford, Pearson Education

Reference Books

1) Fundamentals of Multimedia- Ze Nian and Mark S Drew (PHI)

SATELLITE COMMUNICATION SYSTEMS

Module – I

(12 Hours) Page 66

Introduction to state of satellite communication: Orbital mechanics and parameters,

look angle determination, Launches and Lunch vehicle, Orbital effects in

communication system performance. Attitude and orbit control system(AOCS), TT&C ,

Description of spacecraft System – Transponders,

Equipment reliability and space qualification.

Satellite Link Design: Basics of transmission theory, system noise temperature and

G/T ratio, Uplink and Downlink design, design of satellite links for specified (C/N)

performance.

Module – II

(10 Hours)

Analog telephone and television transmission: Energy dispersal, digital

transmission

Multiple Access: Multiplexing techniques for satellite links, Comprehensive study on

FDMA, TDMA and CDMA. Spread Spectrum Transmission and Reception. Estimating

Channel requirements, SPADE, Random access

Application of Satellite communication: Network distribution and direct broad

casting TV, fundamentals of mobile communication satellite

Module – III

(12 Hours)

Propagation on satellite: Earth paths and influence on link design: Quantifying

attenuation and depolarization, hydrometric & non hydrometric effects, ionosphere

effects, rain and ice effects

Satellite Antennas: Types of antenna and relationships , Basic Antennas Theory –

linear, rectangular & circular aperture. Gain, pointing loss,

Earth station Technology: Earth station design, Design of large antennas –

Cassegrain antennas, optimizing gain of large antenna, antenna temperature, feed

system for large cassegrain antennas,

Design of small earth station antennas: Front fed paraboloid reflector antennas,

offset fed antennas, beam steering, Global Beam Antenna, equipment for earth station

Text Books:

1. Satellite Communication by T. Pratt, C. Bostian. 2nd Edition, John Wiley Co.

Reference Books:

1. Digital Communication with Satellite and Fiber Optic Application, Harlod

Kolimbins, PHI

2. Satellite Communication by Robert M. Gagliardi, CBS Publishers

MICRO-ELECTRO-MECHANICAL SYSTEMS (MEMS) Page 67

Module-I

14 Lectures

Overview of MEMS and Microsystems. (Chapter 1 of Text Book 1)

Micromachining Techniques:

Silicon as material for micromachining,

Photolithography, thin film deposition, doping, wet and dry etching, surface and bulk

micromachining, Wafer bonding, packaging. (Chapter 3 and Section 8.2 of Text Book 1,

Chapter 2 of Text Book 2)

Module II

10 lectures

Microsystem Modeling and Design: Mechanics of deformable bodies, Energy

method, Estimation of stiffness and damping for different micro-structures, Modeling of

electromechanical systems, Pull-in voltage. (Section 4.1 to 4.3 and 6.2.2 of Text Book

1, Section 3.4 of Text Book 2)

Module III

15 Lectures

MEMS Applications: Mechanical sensors and actuators: Piezoresistive pressure

sensors, MEMS capacitive accelerometer, Gyroscopes, Piezoelectric actuators.

(Section 8.3 of Text Book 1 and Section 5.3 and 5.11 of Text Book 2)

Optical: Micro-lens, Micro-mirror, Optical switch (Section 7.5 to 7.7 of Text Book 2)

Radio frequency MEMS: Inductor, Varactor, Filter, Resonator. (Section 9.3 to 9.7 of

Text Book 2)

Microfluidics: Capillary action, Micropumping, Electrowetting, Lab-on-a-chip. (Section

10.1 to 10.8 of Text Book 2)

Text Books:

1. G.K. Ananthsuresh, K.J. Vinoy, S. Gopalakrishnan, K.N. Bhat and V.K. Atre: Micro

and Smart Systems, Wiley India, New Delhi, 2010.

2. N.P. Mahalik: MEMS, Tata McGraw-Hill, New Delhi, 2007.

Reference Book:

1. T. Hsu: MEMS and Microsystems: Design and Manufacture, Tata McGraw-Hill,

New Delhi, 2002.

MEDICAL IMAGING TECHNIQUES (3-0-0)Page 68

Module I

(15 Hours)

X-Ray Machines:

Basis of Diagnostic Radiology, Nature of X-rays, Properties of X-rays, Units of X-

radiation, Production of X-rays : stationary anode tube & rotating anode tube.

X-Ray Machine: High Voltage Generation, High frequency Generator, High Tension

Cable, Collimators & Grids, Exposure Time Systems, and Automatic Control.

Visualization of X-rays & Digital Radiography:

X-ray Films, X-ray Image Intensifier Television System, Dental X-ray machines, portable & mobile X-ray units, Digital Radiography, Flat Panel detector for Digital Radiography.

Module II

(15 Hours)

Ultrasonic Imaging System: Physics of Ultrasonic waves, generation & detection of ultrasound, basic pulse-echo apparatus, brief description of different modes of scans like A-scan, M-mode, B-scan with its applications in medicine.

Computed Tomography Machine (CT):

Basic Principle of CT, System components: scanning system, Detector, Processing system, Viewing system, storing & documentation, Gantry geometry, Patient dose in CT Scan & Advantages of CT Scanning.

Module III

(10 Hours)

MRI Machine & Gamma Camera:

Principles of NMR Imaging System, Basic NMR Components – Block Diagram Description, Advantages of NMR Imaging, The Gamma Camera – Block Diagram Description. Study of Working Principle of Emission CT, SPECT & PET scanners and Introduction to recent developments like Infrared Imaging, Ophthalmic Imaging, and Double headed CT & PET scanner.

Text Book:

Hand Book of Biomedical Instrumentation – 2nd Ed, R.S.Khandpur, Tata McGraw Hill-2003.

Reference Books:

1) Introduction to Biomedical equipment technology, 4e. By JOSEPH.J.CAAR

& JOHN.M.BROWN (Pearson education publication)

(2) Medical Instrumentation-application & design. 3e – By JOHN.G.WEBSTER

John Wiley & sons publications

(3) Leslie. Cromwell – Biomedical instrumentation & measurements, 2e PHI

(4) Dr. M. Arumugam – Biomedical instrumentations, Anuradha Publishers

ANALOG VLSI DESIGN

Module – I

10 Hours Page 69

Introduction to Analog Design: General Concepts, Levels of Abstraction, Robust

Analog Design

Single-Stage Amplifiers: Basic Concepts, Common-Source Stage, Common-Source

Stage with Resistive Load, CS Stage with Diode-Connected Load, CS Stage with

Current-Source Load, CS Stage with Triode Load, CS Stage with Source Degeneration,

Source Follower, Common-Gate Stage, Cascode Stage, Folded Cascode.

Differential Amplifiers: Single-Ended and Differential Operation, Basic Differential

Pair, Qualitative Analysis, Quantitative Analysis, Common-Mode Response, Differential

Pair with MOS Loads, Gilbert Cell.

(Chapters 1, 3 and 4 of Text Book)

Module – II

12 Hours

Passive and Active Current Mirrors: Basic Current Mirrors, Cascode Current Mirrors,

Active Current Mirrors, Large-Signal Analysis, Small-Signal Analysis, Common-Mode

Properties.

Bandgap References: General Considerations, Supply-Independent Biasing, Temperature-Independent References, Negative-TC Voltage, Positive-TC Voltage, Bandgap Reference.

Operational Amplifiers: General Considerations, Performance Parameters, One-Stage Op Amps, Two-Stage Op Amps, Gain Boosting, Comparison, Common-Mode Feedback, Input Range Limitations, Slew Rate, Power Supply Rejection.

(Chapters 5, 11 and 9 of Text Book)

Module – III

14 Hours

Frequency Response of Amplifiers: General Considerations, Miller Effect, Association of Poles with Nodes, Common-Source Stage, Source Followers, Common-Gate Stage, Cascode Stage, Differential Pair.

Feedback: General Considerations, Properties of Feedback Circuits, Types of Amplifiers, Feedback Topologies, Voltage-Voltage Feedback, Current-Voltage Feedback, Voltage-Current Feedback, Current-Current Feedback, Effect of Loading, Two-Port Network Models, Loading in Voltage-Voltage Feedback, Loading in Current-Voltage Feedback, Loading in Voltage-Current Feedback, Loading in Current-Current Feedback, Summary of Loading Effects, Effect of Feedback on Noise.

Oscillators: General Considerations, Ring Oscillators, LC Oscillators, Crossed-Coupled Oscillator, Colpitts Oscillator, One-Port Oscillators, Voltage-Controlled Oscillators, Tuning in Ring Oscillators, Tuning in LC Oscillators, Mathematical Model of VCOs.

(Chapters 6, 8 and 14 of Text Book)

Text Books:

1. Behzad Razavi, Design of Analog CMOS Integrated Circuits, Tata McGraw-Hill Publishing

Company Limited, 2002.

Reference Books:

1. P. Gray, P. Hurst, S. Lewis, and R. Meyer, Analysis and Design of Analog Integrated

Circuits, 4th Edition, John Wiley, 2001.

2. Behzad Razavi, Fundamentals of Microelectronics, 1st Edition, John Wiley, 2008.

3. D. Holberg and P. Allen, CMOS Analog Circuit Design, Oxford University Press, 2002.

4. D. Johns and K. Martin, Analog Integrated Circuit Design, John Wiley, 1997.

5. K.R. Laker and W.M.C. Sansen, Design of Analog Integrated Circuits and Systems,

McGraw-Hill, Inc., 1994.

6. A. Sedra and K.C. Smith, Microelectronic Circuits, 5th Edition, Oxford University Press.

MECHATRONICS

Module – I: Page 70

Sensors and Transduceers:- Sensors and transducers, Performance terminology,

Displacement, position and proximitry, Velocity and motion, Force, Fluid pressure,

Liquid flow, Liquid level, Temperature, Light sensors, Selection of sensors, Inputting

data by switches. Book – 1: 2.1, 2.2, 2.3, 2.4, 2.5, 2.6, 2.7, 2.8, 2.9, 2.10, 2.11, 2.12.

Signal conditioning:- Signal conditioning, The operational amplifier, Protection,

Filtering, Pulse modulation.

Book – 1: 3.1, 3.2, 3.3, 3.4, 3.5, 3.6.

Digital Signals:- Digital signals, Analogue and digital signals, digital-to-analogue and

analogue-to-digital converters, Multiplexers, Data acquisition, Digital signal processing.

Book – 1: 4.1, 4.2, 4.3, 4.4, 4.5, 4.6.

Pneumatic and Hydraulic Actuation Systems:- Actuation systems, Pneumatic and

hydraulic systems, Directional control valves, Pressure control valves, Cylinders, Servo and proportional control valves, process control valves, Rotary actuators.

Book – 1: 7.1, 7.2, 7.3, 7.4, 7.5, 7.6, 7.7, 7.8.

Module – II:-

Mechanical Actuation Systems:- Mechanical systems, Types of motion, Kinematic chains, Cams, GTears, Belt and chain drives, bearings, Mechanical aspects of motor selection. Book – 1: 8.1, 8.2, 8.3, 8.4, 8.5, 8.6, 8.7, 8.8, 8.9.

Electrical Actuation Systems:- Electrical systems, Mechanical switches, Solid-state switches, Solenoids, D.C. motors, A.C. motors, Stepper motors.

Book – 1: 9.1, 9.2, 9.3, 9.4, 9.5, 9.6, 9.7.

Basic System Models:- Mathematical models, Mechanical system building blocks, Electrical system building blocks, Electrical system building blocks, Fluid system building blocks, Thermal system building blocks.Book – 1: 10.1, 10.2, 10.3, 10.4, 10.5.

Module – III:-

System Models:- Engineering systems, Rotational-translational systems, Electromechanical systems, Electromechanical systems, Linearity, Hydraulic-mechanical systems, Summary, Problems.

Book – 1: 11.1, 11.2, 11.3, 11.4, 11.5.

Closed-loop Controllers:- Continuous and discrete control processes, Terminology, Two-step mode, Proportional mode, Derivative control, Integral control, PID controller, Digital controllers, Control system performance, Controller tuning, Velocity control, Adaptive control, Summary, Problems.

Book – 1: 15.1, 15.2, 15.3, 15.4, 15.5, 15.6, 15.7, 15.8, 15.9, 15.10, 15.11, 15.12.

Programmable Logic Controllers:- Introduction to PLCs, Basic Structure of a PLC, Principles of Operation, PLCs versus Computers, Introduction to Internal Architecture

and Hardware Components, PLC Programming, Analog I/O, Selecting a PLC for the

Application, Application of PLCs for Control.

Book – 2: 13.1, 13.2, 13.3, 13.4, 13.5, 13.6, 13.7, 13.8, 13.9.

Text Books:

1. Mechatronics Electronic Control Systems in Mechanical and Electrical Engg. Pearson

Publication, 4th Edition by William Bolton, 2010.

2. Mechatronics Integrated Mechanical Electronic Systems by K. P. Ramachandran, G. K.

Vijayaraghavan, M. S. Balasundaram, Wiley India Edition, Printed on 2008.

Reference Books:

1. Mechatronics integrated Technologies for Intelligent Machines by A. Smaili, F.Mrad,

Oxford University Press, Printed on 2009.

2. Mechatronic Sources Book, Cengage Learning India Edition by Newton C Braga, 2nd

Edition, 2010.

INDUSTRIAL INSTRUMENTATION

Module 1

18 HoursPage 71

Introduction: Functional Units, Classification, Performance characteristics, Dynamic

Calibration, Errors: An Overview, Statistical Error Analysis, Reliability and Related

Topics (Chapter 1 of Text book)

Instruments for Analysis: Introduction, Gas Analysers, Liquid Analysers, X-ray

Methods, Chromatography (Chapter 8 of Text Book)

Module II:

10 Hours

Telemetry: Introduction, Pneumatic Means, Electrical Means, Frequency Telemetring,

Multiplexing, Modulation, Modulation of Digital Data, Transmission Channels, Briefing of

a Telemetry System in Operation, Wireless I/O (Chapter 10 of Text Book)

Module III:

10 Hours

Power Plant Instruments: Introduction, The Power Plant Scheme, Pressure,

Temperature, Flow and Level, Vibration and Expansion, Analysis, Flue Gas Analysis

(Chapter 12 of Text Book)

Hazard and Safety: Initial consideration, Enclosures, Intrinsic Safety, Prevention of

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