# BIJU PATNIK UNIVERSITY OF TECHNOLOGY

## Information Technology (IT)

### 3rd Semester

<table>
<thead>
<tr>
<th>Code</th>
<th>Subject</th>
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<tbody>
<tr>
<td>BSCM1205</td>
<td>Mathematics-III</td>
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<tr>
<td>BEES2211</td>
<td>Network Theory</td>
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<tr>
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<td>Engineering Economics and Costing</td>
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<tr>
<td>HSSM3205</td>
<td>Organizational Behavior</td>
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**Theory Credits** 22

**Practical / Sessional**

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**Practical/Sessional Credits** 6

**TOTAL SEMESTER CREDITS** 28

### 4th Semester

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<td>System Programming</td>
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<td>Design and Analysis of Algorithm Database Engineering</td>
<td>3-1-0</td>
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**Theory Credits** 21

**Practical / Sessional**

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**Practical/Sessional Credits** 6

**TOTAL SEMESTER CREDITS** 27
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:

   Reading Chapters: 11,12(except 12.10),13,14,15
   Reading chapter: 18

Reference books:

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.


**Text Book:**

**Reference Book(s):**
8. Network Theory, Smarajit Ghosh, PHI.
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 $E_F$ 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.


Module III (12 Hours)


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, $Q_{inv}$ in MOSFET.

9. **MOS Transistor**: Introduction to the MOSFET, Complementary MOS (CMOS) technology, V-I Characteristics, Surface mobilities and high-mobility FETs, JFET, MOSFET $V_t$, Body effect and steep retrograde doping, pinch-off voltage,
Text Books:

Reference Books:

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.
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)
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 $R_E$. Effect of $R_S$ and $R_L$ on CE Amplifier, Emitter Follower, Analysis of
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 $R_S$. Effect of $R_{SIG}$ and $R_L$ 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 ($f_t$), 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)


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, 9th/10th 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.

**Reference Books:**

HSSM3204 Engineering Economics & Costing

Module-I: (12 hours)


Module-II: (12 hours)


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:


Reference Books:

4. Gupta, “Managerial Economics”, TMH
5. Lal and Srivastav, “Cost Accounting”, TMH
HSSM 3205 Organizational Behaviour

Module I:

Module II:

Module-III:

Text Books:

Reference Books:
1. Stephen P. Robbins, Organisational Behaviour, Prentice Hall of India
4. Steven L McShane, Mary Ann Von Glinow, Radha R Sharma” Organizational Behaviour”, TATA McGraw-Hill.
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.
      iii. Motivating subordinates / juniors (‘pep talk’) 
      iv. Instructing/ directing subordinates/ juniors
      v. Expressing / recording appreciation, praising / rewarding a subordinate or junior
   b. Subordinate / Junior ➔ Superior / Senior
      i. Responding to the above
      ii. Reporting problems / difficulties / deficiencies
      iii. Offering suggestions
List of Experiments

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

6. Frequency response of a common-emitter amplifier: low frequency, high frequency and mid frequency response.
8. Study of Darlington connection and current mirror circuits.
10. Application of Op-Amp as differentiator, integrator, square wave generator.
11. Square wave testing of an amplifier.
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)
   Programs on file handling (1 class)
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)
Semigroups, Monoids, Groups, Subgroups, Cosets, Lagrange theorem, Permutation groups, Group codes, isomorphism, Homomorphisms, Normal subgroups, Rings, Integral Domain and Fields.
Algebraic systems, Lattices, Distributive and Complemented Lattices, Boolean Lattices and Boolean Algebra, Boolean Functions and Boolean Expressions.

Text Books:
Chapters: 1, 2(2.4), 4, 6(6.1, 6.2, 6.4-6.6), 7, 8, 9
Chapters: 10 (10.1- 10.10), 11(11.1 – 11.7)

Reference Books:
Module I (10 Hrs)
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.
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)
Module- I  
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.

Module – II  
Dynamic programming algorithms (Matrix-chain multiplication, Elements of dynamic programming, Longest common subsequence)
Greedy Algorithms - (Assembly-line scheduling, Activity- 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  
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:

Reference Books:
1. Algorithms – Berman, Cengage Learning
5. Algorithm Design – Goodrich, Tamassia, Wiley India.
Module 1: (12 Hrs)
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

Module 2: (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.

Module 3: (12 Hrs)
Transaction processing and concurrency control: Transaction concepts, concurrency control, locking and Timestamp methods for concurrency control.
Database Recovery System: Types of Database 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)
5. Fundamentals of Database Management System – Gillenson, Wiley India
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)


**Text Books:**


**Reference Books:**

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.
7. Shift Registers: Design and investigate the operation of all types of shift registers 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.
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.
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)
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#### INFORMATION TECHNOLOGY (IT)

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**Theory Credits**: 18
**Practical/Sessional Credits**: 6

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**Total Semester Credits**: 24

**Total Cumulative Credits**: 134
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.


Reference Books:
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.
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 queueing 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

Recommended Reference books:
2. A.Ravindran, K.M.Ragsdell, G.V.Reklaitis,” Engineering Optimization”, Second edition, Wiley India Pvt Ltd
Module – I  
Overview of Data Communications and Networking.
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  
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  
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:
Reference Book:
2. Computer Networks: Natalia Olifer, Victor Olifer, Willey India
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
Module – I  

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  
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  
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:

Reference Book :
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.

Module - III      12 Hrs
Applets: Basics, Architecture, Skeleton, The HTML APPLET Tag, Passing Parameters to Applets, Applet context and show documents () .
Event Handling: Delegation Event model, Event Classes, Event Listener Interfaces, Adapter classes.
AWT: AWT Classes window fundamentals, component, container, panel, Window, Frame , Canvas, Creating a frame window in an Applet , working with Graphics , Control Fundamentals , Layout managers, Handling Events by Extending AWT components.
Core java API package, reflection, Remote method Invocation (RMI)
Swing: J applet, Icons & Labels, Text fields, Buttons, Combo boxes, Tabbed panes, Scroll panes, Trees, Tables.
Exploring Java-lang: Simple type wrappers, Runtime memory management, object (using clone () and the cloneable Interface), Thread, Thread Group, Runnable.

Text Books:

Reference Books:
1. Balguruswamy, Programming with JAVA, TMH.
2. Programming with Java: Bhave &. Patekar, Pearson Education.
5. Java How to Program: H.M. Deitel & Paul J. Deitel, PHI, 8 Edition
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, denotational and axiomatic semantics of toy languages, languages with higher order constructs and types, recursive type, subtype, semantics of non determinism and concurrency.

Text Books:

Reference Books:
PECS5304 THEORY OF COMPUTATION (3-0-0)

Module – I 10 Hrs

Module – II 12 Hrs

Module – III 14 Hrs

Text Books:
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
4. Elements of Theory of Computation: Lewis, PHI
5. Theory of Automata and Formal Languages: Anand Sharma, Laxmi Publication
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.

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
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:
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
Module-I: (12 Hours)


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)


Module-III: (14 Hours)

Mathematical Representation of Noise: Some Sources of Noise, Frequency-domain Representation of Noise, Superposition of Noises, Linear Filtering of Noise.


Text Book:

Supplementary Reading:
2. Analog Communication by Chandra Sekar, Oxford University Press.
Module-I: (12 Hours)

Module-II: (15 Hours)

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.
Closed loop frequency response: Constant Mcircles, Constant N-Circles, Nichol’s chart.

Text Books:
1. Modern Control Engineering by K. Ogata, 5th edition PHI.

Reference Books:
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
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
3. Web Technologies, Uttam K Roy, Oxford
MODULE-I
INTRODUCTION TO OPERATING SYSTEM:
Operating System Structures: Operating System Services, System components, Protection system, Operating System Services, system calls

PROCESS MANAGEMENT:

MODULE-II

MODULE-III
STORAGE MANAGEMENT:
CASE STUDIES: The LINUX System, Windows XP, Windows Vista

TEXT BOOK:

REFERENCE BOOK:
2. Operating Systems – Pabitra Pal Choudhury, PHI
SOFTWARE ENGINEERING

Module – I (Lecture Hour 12)


Module – II (Lecture Hour 12)


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

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 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


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
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 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 8251 USART

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

**80386 Microprocessor:** Introduction, Architecture, Pins & Signals, Memory System, Registers, Memory Management, Paging Technique, Protected Mode Operation.
(Book-2: Ch.1.1 to 1.9, ch.2.1 to 2.4, ch.3.1 to 3.3, ch.4.1 to 4.10, ch.5.1 to 5.8, ch.6.1 to 6.4, ch.7.1 to 7.5, ch.10.1 to 10.3, 10.7, 10.9)

MODULE – III (15 HOURS)
**8051 Microcontrollers:** Microcontrollers and embedded processors, Overview of the 8051 family

**8051 Hardware Connection:** Pin description of the 8051

**8051 Assembly Language Programming:** Inside the 8051, Assembly, Programming
Assembling and Running an 8051 Program, The Program Counter and ROM Space in the 8051
8051 data types and Directives, PSW Register, register Banks and Stack

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

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

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

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

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

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

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

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

Motor Control: RELAY, PWM, DC, and Stepper Motors: Relays and Optoisolations, 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


.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 Pearson
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**
2. E-commerce, Jibitesh Mishra, Macmillan
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
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

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.

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:

Reference Book:
1. B. Sklar and P K Ray; Digital Communications – Fundamentals and Applications; Pearson Education; 2009
MODULE-I
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:

Reference Book:
1. Taub, Schilling, Saha, Taub’s Principles of Communication Systems, TMH.
Module – I


   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.


Module – III


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:
2. Introduction to Robotics: Mechanics and control, John J Craig, PHI

Reference Books:
3. Robotics, Appu 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.
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
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:
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- Embedding 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.(Dining Philosopher problem / Cigarette Smoker problem / Sleeping barber problem)
4. Programs on UNIX System calls.
5. Simulation of CPU Scheduling Algorithms. (FCFS, RR, SJF, Priority, Multilevel Queueing)
6. Simulation of Banker’s Algorithm for Deadlock Avoidance, Prevention
7. Program for FIFO, LRU, and OPTIMAL page replacement algorithm.

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## BIJU PATNAIK UNIVERSITY OF TECHNOLOGY,
 ORISSA
 INFORMATION TECHNOLOGY (IT)

### 7th Semester

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### 8th Semester

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TOTAL SEMESTER CREDITS | 23  
TOTAL CUMULATIVE CREDITS | 181
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:**
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
Module - I (12 Hrs.)
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.)

Text Book :

Reference Book :
SOFTWARE PROJECT MANAGEMENT

Module I: Project Evaluation and Planning (12Hrs)

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)

Text Book

References:
ARTIFICIAL INTELLIGENCE

Module 1  12Hrs

Module 2  10Hrs

Module 3  8Hrs

Text Book:

References:
1) Introduction to Artificial Intelligence & Expert Systems, Dan W Patterson, PHI., 2010
2) S Kaushik, Artificial Intelligence, Cengage Learning, 1st ed. 2011
REAL-TIME SYSTEMS

MODULE-1  10Hrs
Introduction: What is real time, Applications of Real-Time systems, A basic model of Real-time system, Characteristics 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
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.

Text Book:

References:
2. C.M. Krishna and K.G. Shin, Real-Time Systems, TMH.
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

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:

Reference Books:
CRYPTOGRAPHY AND NETWORK SECURITY

Module 1 10Hrs

Module 2 10Hrs

Module 3 10Hrs

**Text Books**

**References**
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)
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.

Textbook

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

References:
3. Hwang & Jotwani, Advance Computer Architecture, TMH
Module – I  
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  
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 – I.  
Selected portion of chapter 6 of textbook - 2.  

Module- III  
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:  
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  

Reference Book :
VLSI DESIGN

Module – I
08 Hours
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.
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
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 $I_{DDQ}$ Test.

Text Books:

Reference Books:
MODULE – I
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 stage combination switching. (Chapter 1, 4 and 6)

MODULE – II
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
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
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 Recorders: Electrocardiograph (ECG), Phonocardiograph, Electroencephalograph (EEG), Electromyograph (EMG)

Module – III (14 Hours)
Patient Monitoring Systems: System Concepts, Measurement of Heart Rate, Blood Pressure Measurement, Measurement of Respiration Rate


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

Text Books:

Reference Books:
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
Chemistry in Environmental Engineering: Atmospheric chemistry, Soil chemistry, Material balances and Reactor configurations.

Module – II
Water Treatment: Water treatment processes, Pre-treatment of water, Conventional process, Advanced water treatment process.
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 meterereology, 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.
Environment impact Assessment, Origin and procedure of EIA, Project Screening for EIA, Scope studies, Preparation and review of EIS.

Text Book
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
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.

WIRELESS SENSOR NETWORKS
Unit I

Network deployment: Structured versus randomized deployment, Network topology, Connectivity, Connectivity using power control, Coverage metrics, Mobile deployment.

Unit II

Synchronization: Issues and Traditional approaches, Fine-grained clock synchronization, and Coarse-grained data synchronization.

Unit III

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:

References Books:
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:

Reference Books:
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
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
Module - I (12 hours)

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.

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)

Reference Books
1) Mobile Communication- Schiller (Pearson)
2) Mobile Computing – Raj Kamal (Oxford)
3) Wireless Communication – Rappaport (PHI)
Module 1  8Hrs
Molecular Biology Primer: Genes, Molecules, Structure of DNA, Proteins, Analysis.

Module 2  8Hrs

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

MULTIMEDIA SYSTEMS
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.

Module – II (12 hours)

Data Compression: Source, Entropy and Hybrid Encoding, Some basic compression techniques, JPEG, MPEG, H.261, DVI.
Synchronization: Notion of Synchronization, Presentation Requirements, Reference model for Multimedia Synchronization, Synchronization Specification.

Module – III (10 hours)


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

Reference Books
1) Fundamentals of Multimedia- Ze Nian and Mark S Drew (PHI)
Introduction to state of satellite communication: Orbital mechanics and parameters, look angle determination, Launches and Launch 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 broadcasting 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:

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)
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:

Reference Book:
Module I                                       (15 Hours)
X-Ray Machines:
Visualization of X-rays & 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:

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
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**

**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**

**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.


**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:**

**Reference Books:**
Sensors and Transducers:- Sensors and transducers, Performance terminology, Displacement, position and proximity, 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.


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:-


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.


Text Books:


Reference Books:


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

Module III: 10 Hours

Hazard and Safety: Initial consideration, Enclosures, Intrinsic Safety, Prevention of Ignition, Methods of Production, Analysis Evaluation and Construction (Chapter 13 of Text Book)

Text Book:

Reference Books:
1. Process/Industrial Instruments and Controls Handbook, Gregory K. Mc Millian Editor-in-Chief, Douglas M. Considine Late Editor-in-Chief

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