Swami Ramanand Teerth Marathwada University
Dyanteerth, Nanded
Teaching and Examination Scheme for Second Year Computer Science & Engineering (w.e.f. academic year 2009-10)

Semester - III

01 Mathematics III
02 Digital Systems and Microprocessor
03 Discrete Mathematics
04 Data Structures
05 Data Communication

Semester - IV

01 Mathematics IV
02 Computer Algorithms
03 Principles of Programming Languages
04 System Programming
05 Advanced Microprocessors
06 Communication Skills

Swami Ramanand Teerth Marathwada University, Nanded
Second Year U.G. Structure
(Department: Computer Science & Engineering)
(Semester III)

1. ENGINEERING MATHEMATICS III

UNIT - I Linear Differential equations of Higher order – I 18 Hrs
1.1 Introduction to L.D.E. with constant coefficients
1.2 General solution of f(D)y = X, shortcut methods
1.3 Non-Homogeneous linear equations: i) Solution by Method of variation of parameters
   ii) Solution by Method of undetermined coefficients
1.4 Equations Reducible to L.D.E. with constant coefficients i.e.
   i) Cauchy’s Homogeneous linear equation
   ii) Legendre’s Linear equations

UNIT – II Linear Differential equations of Higher order - II 6 Hrs
2.1 Simultaneous L.D.E. with constant coefficient
2.2 Symmetrical simultaneous equations
   \[ \frac{dx}{P} = \frac{dy}{Q} = \frac{dz}{R} \]
2.3 Applications of L.D.E. to electrical circuits.

UNIT – III Vector Differential Calculus 7 Hrs
3.1 Vector and Scalar functions, fields, derivatives
3.2 Gradient of Scalar field, Directional derivative and Geometrical meaning of gradient (Gradd.)
3.3 Divergence and curl of a vector fields
3.4 Solenoidal and Irrotational vectors
3.5 Second order diff operator and vector identifies

UNIT – IV Vector Integral Calculus 7 Hrs
4.1 Line integral, Line integral independent of path, Line Integral in parametric form
4.2 Circulation of a vector [Work done]
4.3 Green’s Theorem [without proof] its verification and applications
4.4 Surface Integral, Stoke’s Theorem [without proof] and its applications
4.5 Gauss Divergence Theorem [without proof] and its applications to Engineering Problems

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UNIT – V Statistics 6 Hrs
5.1 Corelation: Scatter diagram, Types of correlations
5.2 Karl Pearson’s coefficient of correlation
5.3 Regression: Lines of regressions, Lines of regression of Bivariate data
5.4 Curve fitting: Fitting of curves by Least Square Method

UNIT – VI Probability 6 Hrs
6.1 Introduction, Random variable
6.2 Discrete and continuous Probability Distributions
6.3 Bionomical Distribution
6.4 Poisson Distribution
6.5 Normal Distribution

Text Books

Reference Books:

2. DIGITAL SYSTEMS & MICROPROCESSOR

UNIT 1 Introduction and Logical Functions Representation (7 Hrs)
Analog, Discrete-time and Digital Signals, Difference between Analog and Digital System, Universal Gates, Signed Number Representation, Binary Codes, Boolean algebra & its minimization – SOP and POS Form, Don’t care combinations, KMap (up to 5 variables), and Quine McCluskey method.

UNIT 2 Combinational Logic Designs (7 Hrs)
Half/Full Adder/Subtractor, Carry Look Ahead Adder, Carry Save Adder, 4-bit Parallel Add/sub, BCD Adder / Subtractor , Array Multiplier, Booths Multiplier, Decoders-Encoders, Multiplexers-Demultiplexers, Parity Checker, Comparator, and Barrel Shifter.

UNIT 3 Sequential Logic Designs (6 Hrs)

UNIT 4 8085 Architecture and Pin Diagram (6 Hrs)
Definition of Microprocessor, Microprocessor based system, Evolution of Microprocessors, Properties of 8085, Detailed Architecture of 8085, Pin Diagram of 8085, and Interrupt Circuitry of 8085, De-multiplexing of address and data bus, 8085 clock & reset circuit, Addressing Modes of IC8085.

UNIT 5 8085 Instruction Set and Programming (8 Hrs)
Instruction set of 8085, 8085 programming model, Assembly language Programming – Simple, loop, Conditional, Subroutines etc., Memory mapped I/O, I/O mapped I/O, Exhaustive and Partial decoding, Memory Interfacing with 8085.

UNIT 6 Data Converters (5 Hrs)
Programmable Peripheral Interface IC8255, Introduction to ADC and DAC and their types, ADC IC0808/09 and DAC IC0808/09, Interfacing IC8255 to 8085, Interfacing ADC IC0808/09 and DAC IC0808/09 to 8085.

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Text Books

Reference Books
4. Samuel C. Lee “Digital circuits and Logic design”, PHI.
7. R. Singh, B. P. Singh “Microprocessors, interfacing and Applications, New Age International

3. DISCRETE MATHEMATICS

UNIT-1 (10 Hrs)
Logic & Proofs
Introduction, statements and Notation, Connectives - negation, conjunction, disjunction, Conditional, biconditional, statement formulas and truth tables, well formed formulas, Tautologies, Equivalence of formulas, Duality law, Tautological implications, functionally complete sets of connectives, other connectives, Normal & Principle normal forms. Predicates and Quantifiers, Methods of Proofs, Mathematical Induction.

UNIT-2 (10 Hrs)
Sets, Relations & Functions
Basic concepts of set theory Set, Types of operations on sets, Ordered pairs, Cartesian product, Principle of inclusion and exclusion. Relations, Functions Representation of discrete structures, Relations, Properties of binary relations, Partition and Covering of set, Equivalence relation, Composition, Closure of Relation, Warshall’s algorithm, POSET and, Functions - Types, Composition of functions, Inverse functions, Recurrence relations, Linear recurrence relations, Solution to recurrence relations, Generating functions. (Growth of Functions: Big-O notation)

UNIT-3 Graphs (5 Hrs)
Basic terminology, multi graphs and weighted graphs, paths and circuits, shortest path Problems, Euler and Hamiltonian paths and circuits, factors of a graph.

UNIT-4 Trees (5 Hrs)
Trees, rooted trees, path length in rooted trees, binary search trees, spanning trees and cut set, theorems on spanning trees, cut sets, circuits, minimal spanning trees.

UNIT-5 Lattices (6 Hrs)
Lattice as POSET, definition, examples and Properties, Lattice as algebraic systems, Special lattices, Boolean algebra definition and examples, Boolean functions, representation and minimization of Boolean functions.

UNIT-6 Algebraic Systems (4 Hrs)
Semi groups and monoides, properties and examples. Algebraic Systems, Groups, Semi Groups, Monoid, Subgroups, Codes and Group codes, Isomorphism and Automorphisms, Homomorphism and Normal Subgroups.

Text Books

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4. DATA STRUCTURES

UNIT I (7 Hrs)
- Review of ‘C’: Arrays, pointers, Functions (call by values and call by reference), Recursion, and Files (open, close and edit files in C).
- Introduction to data structures: Information and Meaning, Primitive data structures and Non primitive data structures, Arrays, Structures, Pointers, Abstract Data Types (ADT), Realization of ADT in ‘C’.

UNIT II (7 Hrs)
- Linear Data structures
  - The Stack: Operations (PUSH and POP), Representation in C.
  - Applications of stacks: Infix, Prefix and Postfix expressions and their Conversions, Recursion.
  - Queues: Operations (insertion and deletion), Representations, Priority queues.

UNIT III (7 Hrs)
- Linked Lists: Singly Linked list and its operations, Circular lists and its operation, Doubly linked list and its operations.

UNIT IV (7 Hrs)
- Non linear Data structures: Trees, Binary trees, Binary tree representations (sequential and linked ), Tree traversals ( Preorder, Postorder and Inorder)
- Applications of Binary Trees: Evaluating expressions tree, Binary search tree, and Game tree.

UNIT V (6 Hrs)
- Graphs: Definition, Types of Graphs, Representations of graph: Adjacency List, Adjancency matrix representations
- Traversal of graph: Breath First Search, Depth First Search.

UNIT VI (6 Hrs)
- Indexing and Searching: Basic Indexing and search techniques, Hashing, Tree Indexing, Construction of hash tables and Construction of binary search trees

Text books

Reference Books

5. DATA COMMUNICATION

UNIT I (7Hrs)
- Introduction: Data communication, Networks, internets
- Network models: layered tasks, The OSI model and layers, TCP/IP protocol suit, Addressing
- Data and Signals: Analog and Digital, Periodic and analog, digital signals, transmission impairment, data rate limits, Performances.

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UNIT II (6 Hrs)
. Bandwidth Utilization: Multiplexing, Spread Spectrum

UNIT III (6 Hrs)
. Transmission media: Guided media, unguided media
. Switching: Circuit Switching Network, Data gram network, virtual- circuit network, and structure of a switch.

UNIT IV (6 Hrs)
. Data Transmission: Telephone network, Dial-up modems, Digital subscriber line, cable TV network and Data transfer.
. Error Detection and Correction: Block coding, linear block code, cyclic code, and checksum.

UNIT V (8 Hrs)
. Data link control: Framing, flow and error control, protocols, noisy and noiseless channels. HDLC, Point-to-point protocol.
. Multiple Access: Random access, Controlled access, channelization.

UNIT VI (7 Hrs)
. Wireless LANs: IEEE 802.11, Blue tooth.
. Connecting LANs: Connecting Devices, backbone network, Virtual LAN.

Text Book

Reference Books
4. "Data Communications", Gupta P., PHI, 2004

Swami Ramanand Teerth Marathwada University, Nanded
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(Semester IV)

1. ENGINEERING MATHEMATICS IV

UNIT - I Laplace Transforms and Applications 10 Hrs
1.1 Definition, Existence of L.T.
1.2 Properties: Linearity, Change of scale, First shifting, Second shifting, Multiplication by t, Division by t., L.T. of derivative and integral
1.3 Inverse L.T., Methods of obtaining inverse L.T., Convolution Theorem
1.4 L.T. of special functions
   i) Unit (Heaviside) step function
   ii) Unit Impulse function (Dirac delta function)
   iii) Periodic functions
1.5 Applications of L.T. to initial value problems, simultaneous differential equations

UNIT – II Fourier Series and Fourier Transforms 8 Hrs
2.1 Fourier series: Definition, Dirichlet’s conditions, Euler’s formulae
2.2 Fourier series over (0, 2... Functions having points of discontinuity

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2.3 Change of interval  
2.4 Expansions of Even and Odd functions, Half range series  
2.5 Fourier Integrals: Definition complex form of Fourier integral  
2.6 Fourier Sine and Cosine Integral  
2.7 Fourier Transforms, Fourier Sine and Cosine Transforms  

UNIT – III Z Transforms 4 Hrs  
3.1 Definition: Standard properties, ZT of standard sequences  
3.2 Inverse Z Transform  
3.3 Applications of Z Transform to simple difference equations  

UNIT – IV Complex Analysis – I 6 Hrs  
4.1 Introduction of complex variable, limit, continuity and derivative  
4.2 Analytic function, C-R equation in cartesian and polar form  
4.3 Harmonic functions, Orthogonal System  
4.4 Construction of analytic function f(z) = u ± iv if u or v or u ± v are given  

UNIT – V Complex Analysis – II 8 Hrs  
5.1 Complex Integration: Line Integral of complex plane  
5.2 Cauchy’s Integral Theorem for simply and multiply connected regions  
5.3 Cauchy’s Integrated formula  
5.4 Series of Complex terms: Convergence, Behavior radius of convergence of series  
5.5 Taylor’s and Laurent’s series [without proof]  
5.6 Singularities, Residues, Residues Theorem, Evaluation of real definite integrals  
5.7 Conformal mappings: Translation, Magnification rotation and Bilinear Transformation  

UNIT – VI Numerical Analysis 4 Hrs  
6.2 2) Iterative Methods of solution: Gauss Seidal Iteration Method.  

Text Books  

Reference Books:  

2. COMPUTER ALGORITHMS  

UNIT I (7 Hrs)  
- **Role of algorithms in Computing:** Algorithms, Algorithms as a technology  
- Getting started, Insertion sort, Analyzing algorithms, Designing algorithms.  
- Growth of Functions: Asymptotic Notations: o , θ , Ω Complexities (Time and space).  

UNIT II (7 Hrs)  
- **Recurrences:** The substitution method, The recurrence tree method and master’s method.  
- Sorting algorithms: Heaps, Maintaining a heap property, Building a heap, Heap sort, Priority queues and Quick sort.  

UNIT III (6 Hrs)  
- **Dynamic Programming** – Assembly line scheduling, Matrix chain multiplication, elements of dynamic programming, Longest common subsequences and optimal binary search trees.
UNIT IV (8 Hrs)
- Greedy method – An activity selection problem, Elements of greedy strategy, Huffman codes.
- Data structures for disjoint sets: Disjoint set operations, Linked list representation of disjoint sets, and Disjoint forest.

UNIT V (8 Hrs)
- Graph algorithms: Minimum cost spanning trees, Single source shortest paths, All pair shortest paths.

UNIT VI (6 Hrs)
- NP-Hard and NP-complete problems - Basic concepts, Reducibility, Cook’s theorem (without proof), NP-Hard graph problems.

Text Books

Reference books

3. PRINCIPLES OF PROGRAMMING

UNIT I (4 Hrs)

UNIT II (7 Hrs)

UNIT III (6 Hrs)
- Data Types and Type Information, Simple Types, Type Constructors, Type Nomenclature in Sample Languages, Type Equivalence, Type Checking, Type Conversion, Polymorphic Type Checking, Explicit Polymorphism, Expressions, Conditional Statements and Guards, Loops and Variation on WHILE, The GOTO Controversy, Exception Handling.

UNIT IV (9 Hrs)

UNIT V (9 Hrs)

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UNIT VI (5 Hrs)

Text Book

Reference Books

4.SYSTEM PROGRAMMING

UNIT I (5 Hrs)
Introduction
System Software and Machine architecture, Simplified Instructional Computer, Traditional CISC Machines-VAX architecture, Pentium Pro architecture, RISC Machines-Ultra SPARC architecture, PowerPC architecture, Cray T3E architecture, Instruction formats-Addressing modes.

UNIT II (8 Hrs)
Assemblers

UNIT III (8 Hrs)
Loaders and Linkers

UNIT IV (8 Hrs)
Macro Processors

UNIT V (7 Hrs)
Compilers and Utilities
Basic Compiler Functions, Different phases of a compiler, Machine Dependent Compiler Features, Machine Independent Complier Features, Simple one pass compiler, Implementation Examples- SunOS C Compiler.

UNIT VI: (4 Hrs)
Software Tools for program development, Steps in Program Development, Editors and its Types, Design of an Editor, Debug Monitors, Programming Environments, User Interfaces – Command Dialogs, Structure of User Interface.

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Text Books

Reference Books

5. ADVANCED MICROPROCESSORS

UNIT 1 8086/88 Architecture and Instruction Set (8 Hrs)
8086 architecture, Addressing modes, Instruction formats, Data transfer, String, Logical, Arithmetic, Branch, Loop, and Processor control instructions, Logical to Physical address translation, Comparison of 8086 with 8088. (8) Hrs

UNIT 2 8086 Operating Modes, Interrupts and Programming (7 Hrs)
Basic 8086 configurations: Maximum and Minimum mode, Support chips 8282, 8284, 8286, 8288, 8086 stack structure, 8086 interrupts, Assembly Language Programming using DEBUG/MASTM.

UNIT 3 Memory Interfacing, RISC/CISC and 8051 (8 Hrs)
Memory interfacing with 8086. Even & Odd Memory banks, Features of RISCCISC Architecture, RISC vs. CISC, difference between microprocessor & microcontroller, 8051 Architecture, I/O configuration, Interrupts, Port structure and operation, Timer/ counter functions, Memory organization, Addressing mode and Overview of instruction set of 8051.

UNIT 4 Intel x86 Families (5 Hrs)
80x86 Family i.e.80286, 80386, 80486, Real mode and Protected mode, software model of 80x86 family, Registers, Data Organization, Instruction types, Addressing Modes and Interrupts, Interrupt Vector Table, Interrupt Processing Sequence, Special interrupts, comparison of 80x86 microprocessors.

UNIT 5 Peripherals Interfacing and Advance Programming (9 Hrs)
Programmable Interval Timer IC8253, Programmable Interrupt Controller IC8259, Keyboard and Display controller IC8279, IC8086 interfacing with IC8253, IC8259 and IC8279, Using EXTRN and PUBLIC, Macros, Multitasking, Memory Management, Memory Resident program.

UNIT 6 Pentium and Higher End Processors (8 Hrs)
Pentium’s Superscalar Architecture, Pipelining, Branch Prediction, Instruction and Data Caches, Floating Point Unit, Segmentation, Paging, Multitasking, Exceptions and interrupts, Virtual and Protected mode, Intel’s Dual Core, Core 2 duo and EPIC Technology: architecture, advantages, future scope.

Text Books
1. Liu & Gibson “Microcomputer system – The 8086/8088 family”, , PHI.
2. Ray and Bhurchandi “Advanced Microprocessors and Peripherals”,, TMH.
4. “Microprocessors, Interfacing & Assembly language programming”, Douglas Hall, TMH.

Reference Books
2. Tabak Daniel “Advanced Microprocessor”, , TMH.

6. COMMUNICATION SKILLS

UNIT I Basics of Communication (3 Hrs)
Definition; Elements of Communication; Cycle of Communication and Feedback. Types of Communication: Verbal and Nonverbal (Oral, Written, Graphic Language and Body Language) Upward and
Downward, Formal and Informal, Media of communication: verbal non-verbal and audio-visual, Principles of Effective Communication, Barriers of Communication.

UNIT II Listening Skills (3 Hrs)
Active Listening: Basic Principles Listening and Note Making, listening to Conversations from IELTS

UNIT III Reading Skills (2 Hrs)
Active Reading, Types, Skimming, Browsing, etc. Reading and Note Making, Comprehension

UNIT IV Speaking Skills (4 Hrs)
Basics of Presentation, Techniques, Group Discussions. Interview techniques, Public Speaking and Seminars, Pronunciation Basics.

UNIT V Writing Skills (4 Hrs)
Business Correspondence, Business Letters, Job Application, Resume, Paragraph (Technical, Business or General current issues) Reports.

UNIT VI English Grammar and Vocabulary (4 Hrs)
Tenses, Common Errors in English, Synonyms, Antonyms, One Word Substitution.