UNIVERSITY OF PUNE
SE (COMPUTER ENGINEERING) 2003 COURSE
Part - One

Subject Code No.	Subject	Teaching Scheme Hours / Week		Examination Scheme				Total Marks
		Lect	Pract	Paper	T/W	Pract	Oral	Total
210241	Discrete Structures	4	----	100	---	---	---	100
210242	Electronics Devices & Circuits	3	----	100	---	---	---	100
210243	Digital Electronics and Logic Design	3	----	100	---	---	---	100
210244	Data Structures and Algorithms	4	----	100	---	---	---	100
207005	Financial and Industrial Management	4	----	100	---	----	----	100
210246	Programming Laboratory	2	4	---	25	50	---	075
210247	Digital Electronics Laboratory	---	4	---	25	50	---	075
210248	Soft Skills	---	2	---	50	---	---	50
	Total	**20**	**10**	**500**	**100**	**100**	**---**	**700**
	Total of Part I (A)		**30 Hrs**					**700**

Part - Two

Subject Code No.	Subject	Teaching Scheme Hours / Week		Examination Scheme				Total Marks
		Lect	**Pract**	**Paper**	**T/W**	**Pract**	**Oral**	**Total**
207003	Eng. Maths – III	4	---	100	---	---	---	100
210249	Microprocessors and Interfacing Techniques	4	---	100				100
210250	Data Structures	4	---	100	---	---	---	100
210251	Computer Graphics	3	---	100	---	---	---	100
210252	Computer Organization	3	---	100	---	---	---	100
210253	Object Oriented Programming Computer Graphics Laboratory	2	2	---	50	50	---	100
210254	Microprocessors and interfacing Laboratory	---	4	---	50	50	---	100
210255	Data Structures Laboratory	---	4	---	50	50	---	100
	Total	**20**	**10**	**500**	**150**	**150**	**---**	**800**
	Total of Part II (B)		**30 Hrs**					**800**
	Grand Total (A) + (B)							**1500**

Th : Theory Tw : Term Work Pr : Practical Or : Oral

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210241 : DISCRETE STRUCTURES

Teaching Scheme	Examination Scheme
Lectures: 4 Hrs/week	Theory: 100 Marks

Prerequisite : Knowledge of Basic Concepts in Mathematics such as Algebra, Sets, Graphs and Calculus

Learning Objectives :

1. To study discrete objects and relationships among them
2. To demonstrate how these concepts can be applied to solve nontrivial real life problems

Unit 1 : Logic and Proofs

Propositions, Conditional Propositions, Logical Connectivity, Prepositional calculus, Universal and Existential Quantifiers, Proofs, Proof Techniques, Mathematical Induction

Set Theory - Set, Combination of sets, Finite and Infinite sets, Un-countably infinite sets, Principle of inclusion and exclusion (8 Hrs)

Unit II : Combinatorics and Discrete Probability

Permutations and Combinations: rule of sum and product, Permutations, Combinations, Algorithms for generation of Permutations and Combinations.

Discrete Probability, Conditional Probability, Information and Mutual Information, Binomial Coefficients and Combinatorial Identities. (8 Hrs)

Unit III : Relations

Definitions, Properties of Binary Relations, Equivalence Relations and partitions, Partial ordering relations and lattices, Chains and Anti chains.

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Functions :

Definitions, domain, Range, One-to-One and On-To, Inverse and Composition, Pigeonhole Principle, Discrete Numeric functions and Generating functions, Job scheduling Problem.

Recurrence Relations :

Recurrence Relation, Linear Recurrence Relations With constant Coefficients, Homogeneous Solutions, Total solutions, solutions by the method of generating functions. (10 Mrs)

Unit IV : Graphs

Basic terminology, multi graphs and weighted graphs, paths and circuits, shortest path in weighted graph, Hamiltonian and Eulerian paths and circuits, factors of a graph, planer graph and Traveling salesman problem. (8 Mrs)

Unit V : Trees

Trees, rooted trees, path length in rooted trees, prefix codes, binary search trees, spanning trees and cut set, minimal spanning trees,

Kruskal's and Prime's algorithms for minimal spanning tree, The Max flow -Min cut theorem (transport network). (8 Hrs)

Unit VI : Groups and Rings

Algebraic Systems, Groups, Semi Groups, Monoid, Subgroups, Permutation Groups, Codes and Group codes, Isomorphism and Automorphisms, Homomorphism and Normal Subgroups, Ring, Integral Domain, Field, Ring Homomorphism, Polynomial Rings and Cyclic Codes
(8 Hrs)

Text Books

1. C. LIU, "Elements of Discrete Mathematics" 2nd Edition, Tata McGraw-Hill, 2002, ISBN 0-07-043476 X.
2. R. Johnsonbaugh, "Discrete Mathematics", 5th Edition, Pearson Education, 2001 ISBN 81 - 7808 - 279 - 9 (Recommended for Unit I and Unit II)

Reference Books

1. N. Biggs, "Discrete Mathematics", 2nd Edition, Oxford, 2002 ISBN 0 -19 - 850717 - 8
2. E. Goodaire, M. Parmenter, "Discrete Mathematics with Graph Theory", 2nd edition, Pearson Education, 2003 ISBN 81 - 7808 - 827 - 4 (Recommended for Recurrence relations).
3. N. Deo, "Graph theory with application to Engineering and Computer Science", Prentice Hall of India, 1990, 0 - 87692 - 145 - 4 (Recommended for Graph)
4. B. Kolman, R. Busby and S. Ross, "Discrete Mathematical Structures", 4th Edition, Pearson Education, 2002, ISBN 81-7808-556-9
5. J. Tremblay, R. Manohar, "Discrete Mathematical Structures with application to Computer Science", Tata McGraw-Hill, 2002 ISBN 0-07-463113-6 (Recommended for prepositional Calculus)
6. F. Harary, "Graph Theory", Narosa Publishing House, 1988 ISBN 81-85015-55-4

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210242 : ELECTRONIC DEVICES AND CIRCUITS

Teaching Scheme Examination Scheme

Lectures: 3 Mrs/week Theory: 100 Marks

Prerequisite : Basic Electronics Engineering (Subject Code: 104011)

Learning Objectives

1. To understand working principles of electronic devices and circuits

To understand applications of electronic devices and circuits

To understand the design and analysis of electronic circuits

Unit I : Transistor Biasing and Small Signal Amplifiers

Transistor Biasing Circuits:

Fixed Bias, Collector Base Bias, Self Bias, Stability Factors - S, S' and S": Definition and derivation of equations for Self Bias Circuit only, Comparison of the bias circuits, Need of and techniques for bias compensation, Thermal run away, Derivation of equation for Thermal Stability. (6 Hrs) **Unit II : Small Signal Amplifiers**

Meaning of Small Signal, Low frequency h-parameter Model, Analysis of C.E., C.B., C.C. Amplifiers using approximate h-parameter model, Miller Theorem and Bootstrap Emitter Follower Circuit, Bootstrap Darlington Pair (6 Hrs) **Unit III : Multi Stage and Large Signal Amplifiers** Multi Stage Amplifiers :

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Need of Cascading, Block Diagram of Cascaded Amplifier, Effect on Gain and Bandwidth, Analysis of Two Stage R-C Coupled Amplifier in CE-CE, CE-CB, CE-CC configurations for determination of Voltage gain (A_v), Current gain (A.), Input Impedance (R_L) and Output Impedance (R_o) Concept of Large Signal Amplification, Large Signal Amplifiers - Classification on the Basis of Q point location, Comparison of various Amplifier Classes (6 Hrs)

Unit IV : FET and MOSFET

3.1 Construction, Types of FET, Symbol, Operation, Drain and Transfer Characteristics and Parameters. JFET and MOSFETS - DMOSFET and EMOSFET, Biasing Circuits for MOSFET- Biasing against Device Variation, Biasing for Zero Current Drift (3 Hrs)

3.2 Small Signal Analysis of FET Amplifier. Parameters-Voltage gain (Av), Input Impedance (Ri) and Output Impedance (Ro) for both CS and CD Amplifie (3 Hrs)

Unit V : Operational Amplifiers

4.1 Block Diagram of an OP-Amp, Direct Coupled Differential Amplifier Circuit, Level Shifter and the Output Stage. Op-Amp Parameters: Definitions, Significance and Typical Values (No Measurement)

(3 Hrs)
4.2 Op-Amp Applications - Precision Rectifier, Zero Crossing Detector, Schmitt Trigger, Waveform Generator, Integrator, Differentiator, Log and Antilog Amplifiers with their Applications, Instrumentation Amplifier, Voltage to Current, Current to Voltage, Voltage to Frequency anc. Frequency to Voltage Conversion Circuits using Op-Amp (3 Hrs)

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Unit VI : Power Devices and Power Supplies

Power Devices : Characteristics and principle of Operation of SCR, TRIAC and IGBT, Applications: Half-wave and Full-wave Controlled rectifiers. (3 Hrs) Power Supplies :
SMPS : Block Diagram, Specifications and Applications UPS : Need of UPS, Types- Online, Off-line and Line interactive, Block Diagram of UPS, Specifications and Applications (3 Hrs)

Textbooks

1. R. Boylstad, L. Nashelsky, "Electronic Devices and Circuit Theory", 8th Ed, Pearson Education, ISBN 81 - 7808 - 590 - 9, 2002
2. R. Gaikwad, "Op-Amp and Linear Integrated Circuits", 4th Ed, Prentice Hall of India, 2002, ISBN 81 - 203 -2058 - 1
3. G. Deboo, C. Burrous, "Integrated Circuits and Semiconductor Devices, Theory and Applications", 2nd Edition, McGraw Hill, 1987,, ISBN 0 - 07 - 016246-8

Reference Books

1. J. Millman, C. Halkias, "Integrated Electronics Analog and Digital Circuits and Systems", McGraw Hill, 1988, ISBN 0 - 07 - Y85493 - 9
2. T. Floyd, "Electronic Devices", 5th Ed, Pearson Education, 2001, ISBN 81- 7808-355-8
3. Liao, "Microwave Devices and Circuits", 3rd Edition, Prentice Hall of India, ISBN 81 - 203 - 0699 - 6
4. N. Mohan, T. Undeland, W. Robbins, "Power Electronics, converters, applications and design", 2nd Edition, John Wiley, 1995, ISBN 9971 - 51 - 177 - 0

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210243 : DIGITAL ELECTRONICS AND LOGIC DESIGN

Teaching scheme Examination scheme

Lectures: 3 Hrs/week Theory: 100 Marks

Prerequisite : Basic Electronics Engineering (Subject Code: 104011)

Learning Objectives

1. To learn and understand basic digital design techniques
2. To learn and understand design and construction of combinational and sequential circuits

UNIT 1 : Number Systems and Codes

Introduction, Binary number System, Binary to decimal conversion and vice versa, signed binary numbers: Sign-Magnitude representation, One's and Two's complement representation, Binary arithmetic, 2's complement arithmetic, Hexadecimal numbers, Octal numbers, BCD code, Excess-3 code, Gray code. Error detecting and correcting codes BOOLEAN ALGEBRA: Axiomatic definition of Boolean algebra, Basic theorems and properties (6 Hrs)

Unit 2 : Logic Families

Characteristics of Digital ICs: Speed, Power dissipation, fan-out, current and voltage parameters, noise margin, operating temperature etc., TTL: Operation of TTL NAND gate, Standard TTL, TTL Characteristics, Active pull-up, Wired-AND, totem pole, open collector, Unconnected Inputs. CMOS Logic: CMOS Inverter, CMOS NAND and NOR, CMOS characteristics. Wired-logic, Unconnected Inputs, Open-Drain Outputs, Comparison of TTL and CMOS, interfacing TTL to CMOS and vice versa, tri-state logic: tri-state buffers, inverters, Study of Data sheets of 7400 Series ICs: (Basic and Universal logic gates) (6 Hrs)

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Unit 3 : Combinational Logic

Introduction, Standard representations for logical functions: K-Map: Representation of truth-table, SOP form, POS form, Simplification of logical functions, Minimization of SOP and POS forms, Don't care conditions, Design Examples: Arithmetic Circuits, BCD-to-7-segment Decoder etc. Minimization using Quine McClusky Method (upto 4 variables only)

Design Using MSI Circuits: Half adder and subtracter, full adder and subtracter, BCD adder and subtracter, look ahead and carry, ALU 74181, code converters, parity generator and checker, magnitude comparator, multiplexers, demultiplexers, decoders, 7485, 74138, Priority encoders

(6 Mrs) **Unit 4 : Sequential Logic**

Flip-Flops: Introduction, 1-Bit Memory cell, Clocked S-R flip-flop, JK flip flop: Race-Around condition, Master slave JK flip-flop, D flip-flop and T flip-flop, Edge-triggered flip-flops, Applications of flip-flops: Bounce-elimination switch, registers, counters and Random Access memory

Sequential Logic design: Introduction, Registers and shift registers, applications of shift registers: Serial-to-Parallel, Parallel-to-Serial, ring counters, Sequence generator and detector, Ripple counters: Up-Down, Modulus of the counter, Synchronous counters. Study of ICs-7473, 7474, 7476, 7490, 74192, 74194, 74373 (6 Mrs)

Unit 5 : Algorithmic State Machines

ASM charts, notations, design of simple controller, multiplexer controller method, RTL notations and implementation (5 Hrs)

Introduction to VHDL : Entity and Architecture, Introduction to modeling styles, Configuration Declaration and important Data Objects and examples of VHDL codes for simple digital circuits (3 Hrs)

Unit 6 : Programmable Logic Devices

Programmable Logic array: Input, Output Buffers, AND, OR, Invert/Non-Invert Matrix, Programming the PLA, Applications of PLAs to implement combinational and sequential logic circuits

Programmable array Logic : Registered PALs, Configurable PALs, Generic Array Logic Devices, EX-OR PALs and Simple PLDs

Complex Programmable Logic Devices (CPLD) :

Introduction, Block diagram. (XC 9500) Introduction to Field - Programmable Gate Array (FPGA) XC 4000, Introduction to ASIC (6 Hrs)

Text Books

1. R. Jain, "Modern Digital Electronics", 3rd Edition, Tata McGraw-Hill, 2003, ISBN 0 - 07 - 049492 - 4
2. J. Wakerly, "Digital Design - Principles and Practices", 3rd Edition, Pearson Education, Xilinx Design Series, 2003, ISBN 81 - 7808 - 577 – 1

Reference Books

1. M. Mano, "Digital Design", 3rd Edition, Pearson Education, 2002, ISBN - 81 - 7808 - 555 - 0
2. J. Yarbrough, "Digital Logic: Applications and Design", Thomson Brooks/Cole (Vikas Publishing House, New Delhi), 2002, ISBN 981 - 240 - 062 - 1
3. J. Bignell, R. Donovan, "Digital Electronics", 4th Edition, DELMAR Thomson Learning, 2001, ISBN 981 - 240 - 352 - 3

4. A. Malvino, D. Leach, "Digital Principles and Applications", 5th Edition, Tata McGraw Hill, 2003, ISBN 0 - 07 - 047258 – 0

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210244 : DATA STRUCTURES AND ALGORITHMS

Teaching Scheme	Examination Scheme
Lectures: 4 Hrs/week	Theory: 100 Marks

Prerequisite : Computer Fundamentals and Programming (Subject Code: 110013)

Learning Objectives

1. To develop the ability to synthesize and analyze algorithms
2. To study the representation, implementation and applications of basic data structures

Unit I : Fundamental Concepts

Introduction to Data Structures: Data, Data objects, data types, Abstract Data types (ADT) and Data Structure, Concept of Primitive and non primitive, Linear and Nonlinear, static and dynamic, persistent and ephemeral data structures,

* Introduction to Algorithms : Definition and Characteristics of an algorithm, Algorithm Design.

Tools : Flowcharts and pseudo code, notations: Algorithm Header, Purpose, conditions and return, statements, statement numbers, variables, comments, statement constructs: sequence, selection, loops and sub-algorithms.

Program development: Analysis, design, Coding, Testing and Verification (8 Hrs)

Unit II : Linear Data Structures using Sequential Organization

Concept of Sequential Organization, arrays as ADT, Storage representation of array (row major and column major), Representation of Polynomials using arrays,

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Representation of sparse matrix, addition, transpose and fast transpose of sparse matrix, Time and space complexity analysis for simple and fast transpose for sparse matrix (8 Hrs)

Unit III : Stacks

Fundamentals, stack as ADT, Representation and Implementation of stack using arrays, Applications of stack: Expression evaluation and conversion, reversing a string, Parsing: Well-form parenthesis, Decimal to Binary Conversion, repre'sentation of multiple stacks using single array

Recursion : Definition, Writing recursive functions, How Recursion works? Simulating recursion using stack (8 Hrs)

Unit IV : Queues

Fundamentals, queue as ADT, Representation and Implementation of queue using arrays Circular queue: representation and implementation, Applications of queue: Josephus Problem, Job

Scheduling, Queue Simulation, Categorizing Data, Doubly Ended Queue, representation of multiple queues using single array, Priority queue (6 Hrs)

Unit V : Searching and Sorting

Searching: Sequential, binary and Index sequential search.

Sorting : General concepts: sort order, sort stability, efficiency and passes, Bubble sort, Selection sort, Insertion sort, Shell, Radix, Quick and Merge sort. (8 Hrs) **Unit VI : Algorithm Analysis and Strategies**

Algorithm Analysis : Time complexity: Real time and Frequency count, Big 'O', "Q" and 0 notations, Space complexity: Compile-time and run-time, best, average and worst cases.

Analysis of searching and sorting algorithms discussed in UNIT-V

Algorithmic strategies : Use and the peculiar characteristics of each type, Divide and conquer (Quick sort/ Tower of Hanoi), backtracking (Eight queens problem), greedy (Job Scheduling with deadlines), dynamic programming (Example Triangulation problem) (Implementation not expected for all the examples) (8 Hrs)

Text Books

1. E. Horowitz, S. Sahni, D. Mehta "Fundamentals of Data Structures in C++", Galgotia Book Source, New Delhi 1995 ISBN 16782928
2. A. Aho, J. Hopcroft, J. Ulman, "Data Structures and Algorithms", Pearson Education, 1998, ISBN-0-201-43578-0

Reference Books

1. R. Gilberg, B. Forouzan, "Data Structures: A pseudo . code approach with C++", Thomson Brookes /COLE Books, 2002, ISBN 981 - 240 - 644 - 1
2. Y. Langsam, M. Augenstin and A. Tannenbaum, "Data Structures using C and C++", 2nd Edition, Prentice Hall of India, 2002, ISBN-81-203-1177-9
3. G. Heileman, "Data Structures, Algorithms and Object oriented Programming", Tata-McGraw-Hill, 2002, ISBN 0-07-048641-7.
4. J. Tremblay, P. Soresan, "An introduction to data structures with Applications", 2nd edition, Tata McGraw-Hill International Editions, 1984, ISBN-0-07-462471-7.

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207005 **: FINANCIAL AND INDUSTRIAL MANAGEMENT**

Teaching Scheme	Examination Scheme:
Lectures: 4 Hrs/ week	Theory: 100 Marks

Unit I : Introduction to Management

Evolution of Management Science, Contributions of F.W. Taylor, Henry Fayol, Gantt, Gilbert etc. Definition of Management, Management as an art, Science and profession, Management Administration and Organization concepts, Levels of Management, Functions of Management, Management by Objectives (MBO) (7 Hrs)

Unit II : Economics and Legal Aspects

2 (a) Basic Economic concepts: Human Wants, Economics Goods, Price, Value, Utility, Wealth, Law of demand, Law of Supply, Scales of production, Internal and external economics of scale. Concepts of E-commerce, E-Business Management, E-Govemance, Enterprise Resource Planning (ERP) 2 (b) Intellectual Property Laws: Patents, Copyrights, Trademarks, Law of Contracts: Salient features. Role of Chambers of Commerce and Industries
(9 Hrs)

Unit III : Business Organization Forms of Business Organization, Definitions, Features, Advantages, Disadvantages of Individual proprietorship, Partnership, Joint Stock Companies, co-operatives and public sector undertakings, Types of companies, Formation of Joint Stock Company, MOA and AOA.

Organizational structures : Definitions, types, merits and demerits of each of structures (Line, Functional, Line and staff, Committee, Matrix and Project structure) (10 Hrs)

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Unit IV : Human Resource Management

Manpower Planning, Factors affecting manpower planning, Process of manpower planning, Recruitment, Selection, Training. Communication: Elements, Process principles, Barriers, listening skills, Body language, Media of Communication

Communication in Organization (Vertical, Horizontal etc.), Motivation concept and meaning, Maslows Theory of need hierarchy, McGregors Theory X and theory Y (7 Hrs)

Unit V : Financial Management

Capital and its significance, Types of capital, Estimation of capital requirements, Methods of rising Capital, Concepts of Money market and Capital market, Cost analysis, Classification of costs, Financial statements P & L account, Balance Sheet. Budget and Budgetary Control, Financial Institutions sources of capital (8 Hrs)

Unit VI : Financial Analysis

Ratio Analysis: Break-even Analysis, Introduction to Capital budgeting methods (Pay Back method, Accounting rates of returns and net present value method). Concepts of annuity, Depreciation, Basics of Credit rating of Software Projects and organization

Ratio analysis liquidity ratios (Current ratio and Quick ratio) Activity ratios (Inventory turnover ratio) Capital turnover ratio (Debt-Equity ratio), Profitability ratio (Gross profit ratio, Net profit ratio) (9 Hrs)

Reference Books /

1 H. Koontz, H. Weihrich, "Essential of Management", Tata McGraw-Hill /

2 K. Dewett, "Elementary Ecomrnic Theory"

3 P. Chandra, "Financial M/aagement theory and Practice", Tata McGraw-H/li

4 A. Aryasri , "Managed?/ Economics and Financial Analysis", Tata McGiW Hill

5 N. Kapoor, "Mercantj/e Laws"

6 L. Bhole, "Financir/Institutions and Markets", Tata McGraw-Hill

7 P. Narayanan, /Intellectual Property Laws", Eastern Law House, Calcutta

8 K. Mohan, *M.* Banerje, "Developing communication skills", Mac-Milan India Limited

9 R. Dafj/"Management", Thomson southwest

210246 : PROGRAMMING LABORATORY

Teaching Scheme	Examination Scheme
Lectures : 2 Hrs/week	Practical: 50 Marks
Practical: 4 Hrs/week	Term Work: 25 Marks

Overview of 'C' programming: Identifiers, variables, constants, data types, operators and expressions, Assignment statement, Control Structures, Arrays, I/O, Formatted I/O: field width, justifications, signed numbers, using '*' with scanf, Introduction to top-down structured programming, Program coding and documentation: comments, variable naming conventions, code indentation etc. (4 Hrs)

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Functions: Defining, function calls and returns, Actual and Formal Parameters, local and global variables, scope rules, concept of a block-structured language, recursive functions. User defined functions, library functions: arithmetic, type conversion, string-Manipulation and diagnostic routines.

Character String^ introduction, Declaration and Initialization, Reading and writing from/to the strings, operations on strings. (4 Hrs)

Pointers: Declaration, pointer operator, address operator, pointer expressions. Pointer arithmetic. Pointers and functions parameters, Parameter Passing: Call by value and reference, pointer as a parameter, pointers to functions, passing function to another function, Pointers and Arrays, Pointers and strings, array of pointers, pointers to pointers. (4 Hrs) **Structures** : Notion, declaration and initialization, structure variables, accessing and assigning values of the fields, "sizeof' operator, functions and structures, arrays of structures, nested structures, pointers and structures, self-referential structures, enumerated data types

Unions : Declaration, initialization, anonymous union, Bit Fields (4Hrs)

Macro Preprocessor : macro definitions, macro with parameters and conditional compiling. Bit-wise and shift operators, using hex, octal numbers, command-line arguments, using argc, agrv and env variables, dynamic memory management: malloc and free, Storage classifiers: auto, static, register and external, compiling multi-file programs: project-make utility, study of various compiler, linker and environment options, command line compiler options, program debugging: breakpoints, watches, trace (6 Hrs)

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Files : Introduction, Defining and Opening a File, Closing a File, Input/Output Operations on Files, Error Handling, Random Access to files (3 Hrs)

Suggested List of Assignments **Group A :**

1. Write a program to perform various string operations such as copy, length, reversing, palindrome, concatenation and to find occurrence of a sub-string using and without using library functions
2. Write a program to understand various logical and bit wise operators
3. Write a program to generate permutations and combinations of a given list
4. Write a program to perform various operations such as union and intersection on sets
5. Write a program to perform addition and multiplication operations on matrix. Write functions to determine whether the matrix is symmetric and skewed
6. Write a program to compute Inverse of a matrix
7. Write a program to solve system of simultaneous equations using Cramer's rule, Gauss Seidal rule, Gauss Elimination method
8. To create a text file, read it and convert into uppercase & write the contents into another text file by using command line arguments.
9. Write a program to implement a small database project to understand the concept of structures, pointers, various operations on files such as create, open, add/ modify/ delete/process/append a record, search a record, sort, merge, close.

Group B :

1. Represent a polynomial using array and write a menu driven program to perform addition, multiplication and evaluation.
2. Implement stack as an ADT. Use this ADT to perform expression conversion and evaluation. (Infix - Postfix, Infix-Prefix, Prefix-Infix, Prefix-Postfix, Postfix-Infix, Postfix-Prefix).
3. Implement circular queue and double ended queue using arrays.
4. Implement following sorting methods: Bubble sort and Selection Sort.
5. Implement Sequential and Binary search.

- Instructor will frame assignments based on the suggested assignments as given above. Students will submit Term Work in the form of a journal that will include at least 16 assignments (at least six assignments from Group B). Each assignment will consist of pseudo algorithm, program listing with proper documentation and printout of the output.
- Practical Examination will be based on the term work and questions will be asked to judge the understanding of the assignments performed at the time of the examination.

Reference Books

1. P. Deshpande, O. Kakade, "C & Data Structures", Dreamtech Press New Delhi, 2003 ISBN 81 - 7722 -424-7
2. E. Bajagurusamy, "C and Data Structures", Tata McGraw-Hill, 2003, ISBN 0 - 07 - 053473 - X
3. S. Kochan, "Programming In C", CBS Publishers and Distributors.

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210247: DIGITAL ELECTRONICS LABORATORY

Teaching Scheme

Practical: 4 Hrs/week

Examination Scheme

Practical: 50 Marks

Term Work: 25 Marks

Suggested List of Assignments

A. Combinational Logic Design

1. T.T.L Characteristics (Study and Write up only)..
2. Code converters, e.g. Excess-3 to BCD and vice versa
3. Multiplexers: Application like Realization of Boolean expression using Multiplexer.
4. Demultiplexers: Applications like Realization of ROM using Demultiplexer.
5. BCD adder / subtracter using 4 bit binary adder 7483.
6. Parity generator / detector.

B. Sequential Circuit Design

1. Flip flops, Registers and Counters (Study and Write up only).
2. 4-bit Multiplier / Divider (Study and Write up only).
3. Ripple counter using flip-flops.
4. Sequence generator using JK flip-flop.
5. Sequence detector using JK flip-flop.
6. Up-down counter using JK flip-flop.
7. Modulo N counter using 7490 & 74190 (N>10).
8. Pseudo random number generator using 74194.
9. Design of a barrel shifter.
10. Study of PSpice/Electronic Workbench/ICAP software

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C. ASM, PALS and FPGA

1. Simple ASM using multiplexer controller method.
2. Design and implementation of digital circuits using RTL (Data section using 74xx series chips and control section using shift register controller and classical methods). 3.Implementation of Hex keypad reader using Counter, Multiplexer, Latch and Combinational circuit.
4. Implementation of combinational logic using PALs
5. Study of FPGA devices (Study and Write up only).

* Instructor will frame assignments based on the suggested assignments as given above. Students will submit the term work in the form of journal consisting of minimum of 16 assignments.

*Practical examination will be based on the term work . and questions will be asked to judge the understanding of assignments performed at the time of examination.

210248: **SOFT SKILLS**

Teaching Scheme	Examination Scheme
Practical : 2 Hrs/week	Term Work: 50 marks

Learning Objectives

1. To encourage the all round development of students by focusing on soft skills.
2. To make the engineering students aware of the importance, the role and the content of soft skills through instruction, knowledge acquisition, demonstration and practice.
3. To develop and nurture the soft skills of the students through individual and group activities.

4. To expose students to right attitudinal and behavioral aspects, and to build the same through activities.

The coverage of soft skills that help develop a student as a team member, leader, all round professional in the long run have been identified and listed here for reference. As the time allotment for the soft kills laboratory is small and the fact that these skills are nurtured over years, students are encouraged to follow up on these skills as self-study and self driven process.

Unit I : Self-Development and Assessment

Self-Assessment, Self-Awareness, Perceptions and Attitudes, Values and Belief Systems, Personal Goal setting, Career Planning, Self-Esteem, Building of Self Confidence.

Unit II : Verbal and Nonverbal Spoken Communication

Includes planning, preparation, delivery and feedback and assessment of activities like: Public speaking, Group discussions, Oral Presentation skills, Perfect interview, listening and Observation skills, Body language, Use of presentation graphics, Use of presentation aids, study of Communication barriers.

Unit III : Written Communications

Technical writing: technical reports, project proposals, brochures, newsletters, technical articles, technical manuals.

Official / business correspondence: Business Letters, Memos, Progress Reports, Minutes of Meeting, Event Reporting. Use of: Style, Grammar and Vocabulary for effective Technical Writing. Use of: Tools, Guidelines for Technical Writing, Publishing.

Unit IV : Ethics and Etiquettes

Business Ethics, Etiquettes in social as well as office settings, E-Mail Etiquettes, Telephone Etiquettes, Engineering Ethics and Ethics as an IT Professional, Civic Sense.

Unit V : Leadership Skills and Interpersonal Communications

Leaders: their skills, roles, and responsibilities. Vision, Empowering and delegation, motivating others, organizational skills, Problem solving and conflict management, team building, interpersonal skills. Organizing and conducting meetings, decision making, giving support

Unit VI : Other Skills

Managing Time, Stress and Meditation. Understanding roles of Engineer's and their responsibilities. Exposure to work environment and culture in today's job places, improving personal memory, Study skills that include Rapid Reading, Nptes Taking, Self learning, Complex problem solving and creativity.

References

Topic 1 : Any good book like

1. Shiv Khera, "YOU CAN WIN", Macmillan Books. 2003 revised edition.
2. Stephen Covey, "7 Habits of highly effective people"

Topic 2 and 3

1. John Collin, "Perfect Presentation", Video Arts MARSHAL.
2. Jenny Rogers, "Effective Interviews", Video Arts MARSHAL.

3. Raman, Sharma, "Technical Communciations", OXFORD.
4. Sharon Gerson, Steven Gerson", Technical Writing process and product", Pearson education Asia, LPE Third Edition.
5. R Sharma, K. Mohan, "Business correspondence and Report writing", Tata McGraw-Hill ISBN O07-044555-9
6. Videos for Technical Education Catalog, National Education and Information Films Ltd, Mumbai.
7. Management Training and Development Catalog, National Education and Information Films Ltd, Mumbai.
8. XEBEC, "Presentation Book 1, 2, 3", Tata McGraw-Hill, 2000, ISBN 0 - 040221 - 3

Topic 4 and 5 and 6

1. Tim Hindle, "Reducing Stress", Essential Manager Series DK publishing.
2. Sheila Cameron, "Business students Handbook", Pitman Publishing.
3. Dr R L Bhatia, "Managing Time for a competitive edge".

4. Lorayne, Lucas "Memory Book".
5. Robert Heller, "Effective leadership", Essential Managers DK publishers.
6. Newstrom, Keith Davis, "Organizational Behavior", Tata McGraw Hill.
7. Sasikumar, P Dhamija, "Spoken English (with video cassettes)", Tata McGraw-Hill ISBN 0-07-460358-2

LIST OF SUGGESTED ASSIGNMENTS

1. Write a Personal essay and or resume or statement of purpose which may include:
(a) Who am I (family background, past achievements, past activities of significance).
(b) Strengths and weaknesses (how to tackle them) (SWOT analysis).
(c) Personal short-term goals, long-term goals and action plan to achieve them.
(d) Self-assessment on soft skills.
2. Students could review and present to a group from following ideas
(a) Book review.
(b) Biographical sketch.
(c) Any topic such as an inspirational story/ personal values/beliefs/current topic.
(d) Ethics and etiquettes and social responsibilities as a professional.
3. Students will present to a group from following ideas
(a) Multimedia based oral presentation on any topic of choice (Business/Technical).
(b) Public speaking exercise in form of debate or elocution on any topic of choice
4. Students will undergo two activities related to verbal/ nonverbal skills from following
(a) Appearing for mock personal interviews.
(b) Participating in group discussions on current affairs/social issues/ethics and etiquettes.
(c) Participating in Games, role playing exercises to highlight nonverbal skills.

5. Students will submit one written technical documents from following
(a) Project proposal.
(b) Product brochure.

(c) Literature survey on any one topic.
(d) User manual.
(e) Technical help.
6. Students will submit one written business documents from following
(a) A representative Official correspondence.
(b) Minutes of meeting.
(c) Work progress report.
7. Students will participate in one or two activities from following:
(a.) Team games for team building.
(b) Situational games for role playing as leaders, members.
(c) Organizing mock events.
(d) Conducting meetings.
8. Faculty may arrange one or more sessions from following:
(a) Yoga and meditation.
(b) Stress management, relaxation exercises, and fitness exercises.
(c) Time management and personal planning sessions.
(d) Improving memory skills.
(e) Improving leadership skills.
(f) Improving English conversation skills.
(g) Reading comprehension skills and Notes taking skills.

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Students are expected to keep a personal record of ANY SIX activities that they undertook in the Soft skills Laboratory in the form of a journal. All students need not do the same assignments. Colleges have a freedom within the framework to customize set of activities to be followed.

Guidelines for Conduction and Assessment of Laboratory Work

1. This laboratory can be seen as a departmental activity with one of the faculty as coordinator.
2. Professionals from HRD departments of companies could assist in training sessions.
3. Certain activities can even be team activities such as technical report submission or joint presentations.
4. Popular science, INTERNET, Magazines, Newspapers, and Training MEDIA from BCL, BBC, Management Institutes, and Management Gurus can also be used as resources.
5. Generally an exercise can be designed to allow multiple skills exposure for example a group task encouraging discussions, team building, value sharing, leadership and role play all at the same time.

ASSESMENT Guidelines

1. WRITTEN Communications 20 Marks

(a) Students could submit for example
(b) Personal resume, essay
(c) Technical document or business document.

2. Spoken communications 20 Marks

(a) One elocution event of say 8-10 minute individually
(b) One group discussion or group presentation event

3. Overall participation in soft skills based lab activities 10 Marks

(a) Attendance and enthusiasm
(b) Participation and contribution in event management, organizing
(c) Group games, group exercises, interpersonal skills observed.
(d) Quality of journal for soft skills laboratory indicating personal progress, participation.

Guidelines for batch wise Time management for laboratory sessions (Two hour session at a time)

A Semester allows for 12-14 sessions. Students can do Lot of preparation at leisure time.

1. Batches could be of size 25 to 30 students.
2. Written communication exercises could be done for whole batch at same time (3 sessions)
3. Spoken communications exercises can be done with around 10-15 students covered in one two-hour slot so total need for one exercise. (2 sessions)
4. Group discussions could be done for groups of 5-8 students at a time for half hour so total need for two group discussions for each student of the batch will be required. (2 sessions)
5. Sessions could be organized for trainers to give directions, knowledge, experience sharing or common viewing of training material on Video etc. (4 sessions)
6. Group exercises for team building, role-playing and interaction with professional. (3 sessions)

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For Electrical + SW/ Instrumentation Engineering (Sem-1)
For Electronics/E&TC/Computer Engineering
&
Information Technology (SEM-II)
207003 Engineering Mathematics - III

Teaching Scheme — Examination Scheme
Lectures : 4 Hrs/week — Paper : 100 Marks
Duration : 3 hrs.

Section I

Unit -1: Linear Differential Equations (LDE) (08 Hours)
General n^{th} order LDE. Solution of n^{th} order LDE with constant coefficients. PI by variation of parmeters. Cauchy's & Legendre's DE. Solution of Simultaneous & Symmetric Simultaneous DE. Applications to Electrical circuits.

Unit - II : Complex Variables (08 Hours)
Functions of complex variables, Analytic functions, C-R equations, Conformal mapping, Billinear transformation, Residue theorem, Cauchy's Integral theorem & Cauchy's Integral formula (without proofs).

Unit - III : Transforms (10 Hours)
Fourier Transform (FT) Fourier Integral theorem. Sine & Cosine Integrals. Fourier Transform, Fourier Cosine Transform and their inverses. Problems on Wave equation.
Introductory Z Transform (ZT) : Definition, Std. Properties (Without proof) ZT of std. Sequences & Inverse. Solution of simple difference equations.

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Section II

Unit - IV : Laplace Transform (IT) (10 Hours; Definition of LT, Properties & theorems. LT of standard functions. LT of some special functions viz. error, I^{st} order Bessel's Periodic, Unit Step, Unit Impulse and ramp. Problems on finding LT & inverse LT. Applications Of LT solving ordinary differential equations

Unit - V : Vector Calculus (08 Hours)
Vector Differentiation & its physical interpretation. Vector differential operator Gradient, Divergence & Curl. Directional derivative. Vector identites.

Unit - VI : Vector Analysis (08 Hours)
Line, Surfact & Voiume integrals. Conservative, Irrotational & Solenidal fields. Scalar Potential. Gauss's, Stoke's & Green's theorems's (without proofs). Applications -to problems in Electromagnetic Fields.

Text Books

1. Advanced Engineering Mathematics, 5e, by Peter V. O'Neil (Thomson Learning
2. Advanced Engineering Mathematics by Erwin Kreyszig (Wiley Eastern Ltd)

Reference Books

1. Advanced Engineering Mathematics, Wylie C.R. & Barrett L.C. (McGraw-Hill, Inc)
2. Higher Engineering Mathematics by B.S. Grewal (Khanna Publication, Delhi)
3. Advanced Engineering Mathematics, 2e, by M. D. Greenberg (Pearson Education).

4. Engineering Mathematics by B.V. Raman (Tata McGraw-Hill)
5. Applied Mathematics (Volumes I and II) by P. N. Wartikar & J. N. Wartikar (Pune Vidyarthi Griha Prakashan, Pune)
6. Advanced Engineering Mathematics with MATLAB, 2e, by Thomas L. Harman, James Dabney and Norman Richert (Books/Cole, Thomson Learning).

210249 : MICROPROCESSORS AND INTERFACING TECHNIQUES

Teaching Scheme Examination Scheme

Lectures : 4 Hrs/week Theory : 100 Marks

Prerequisite : Digital Electronics and Logic Design (Subject Code: 210243)

Learning Objectives

1. To learn the architecture and assembly language programming of 8086/88 microprocessor
2. To study the peripherals and their interfacing with 8086 microprocessor.
3. To provide insight to DOS and BIOS and their functions.

Unit - I

Introduction to 16- bit microprocessor, internal architecture and pin diagram of 8086/8088 microprocessor, Minimum and maximum mode, Support chips as 8282, 8284, 8286,8288, Timing Diagrams, Read and write machine cycles, Address decoding, Even and Odd memory banks, accessing Memory and I/O ports (8 hrs)

Unit - II

Programmers model of 8086/88 - Addressing Modes, accessing data in the memory, instruction set, Instruction encoding format, Introduction to assembly language programming, Assembler, linker, Locator, debugger, emulator concepts. Assembler directives, 8086 programming examples to implement while - do, Repeat - Until, if-then-else constructs etc, String operations, file I/O processing, Far and Near procedures, macros. Timing and delay loops (8 hrs)

Unit - III

8086 interrupt structure, Interrupt Service Routine, Interrupt Vector Table (IVT) - location of IVT in the memory, contents of IVT, Hardware interrupts and Software interrupts - INTR, NMI and INT n. Interrupt response, Execution of an ISR, priority of 8086 interrupts. 8259A priority interrupt controller, block diagram, interfacing and programming, 8254 Timer: Block diagram, control and status registers, interfacing and programming (10 hrs) **Unit - IV**

Digital Interfacing: Programmable parallel ports, Intel 8255, block diagram and interfacing, modes and initialization, Keyboard and display Interfacing using 8255, Keyboard/ Display Controller 8279: block diagram, system connections and programming, Centronix Parallel Printer Interface. Serial communication: Asynchronous and synchronous communication, RS-232C protocol, Intel 8250 UART and 8251 USART, Direct memory Access (DMA) (8 hrs)

Unit - V

Analog Interfacing: DAC and ADC interfacing and applications. Sensors and transducers: Light sensors.

temperature sensors, force and pressure transducers, LVDT, flow sensors, Interfacing with high-power devices, 1C buffers, transistor buffers, interfacing to AC power devices, interfacing to a stepper motor, Concept and design of a simple data-acquisition system and industrial process control system (8 hrs)

Unit - VI

DOS : Internals of DOS, DOS loading, DOS memory map, Internal commands, External commands, command interpreter, POST details. POST sequence, PSP (structure details), '.EXE' and '.COM' file structures, conversion of .EXE to .COM file. BIOS: what and why, BIOS calls: INT 10H calls, DOS calls: INT 2JH' calls. Difference between DOS and BIOS, TSRs: types, Structure, details of TSR loading, examples, writing TSRs in assembly (8 hrs)

Text Books

1. D. Hall, "Microprocessors and Interfacing", 2nd edition, 1992, McGraw-Hill, ISBN - 0 - 07 - 100462 - 9.
2. Y. Liu, G. Gibson. "Microcomputer Systems: The 80867 8088 Family, Architecture, Programming and Design", 2nd Edition, Prentice-Hall of India, 1986, ISBN 0 -87692 - 409 - 7.

Reference Books

1. M. Rafiquzzaman, "Microprocessors - Theory and applications: Intel and Motorola", Revised edition, 2002, Prentice Hall, (Chapters 5. 7, 8) ISBN 81 - 203 - 0848 - 4
2. P. Abel, "Assembly Language Programming", 5th edition, Pearson Education, 2002, ISBN 81 - 203 -1037 - 3.

3. R. Denkon, "Advanced MS-DOS Programming", 2nd edition, BPB Publications, 2002, ISBN 81 - 7029 - 485 - 1 (Chapters 2, 3, 4, 14).
4. R. Lai, "Writing MS-DOS Device Driver", 2nd Edition, Pearson Education (Chapters 2, 3, 5).
5. A. Ray, K. Bhurchandi, "Advanced Microprocessors and Peripherals: Architecture, Programming and Interfacing", Tata McGraw-Hill, 2004, ISBN 0 - 07 -463841 - 6
6. Intel - Microprocessor and peripheral Handbook Volume I.

210250 : DATA STRUCTURES

Teaching Scheme Examination Scheme

Lectures: 4 Hrs/week Theory: 100 Marks

Prerequisite : Data Structures and Algorithms (Subject Code : 210244)

Learning Objectives

1. To study the representation, implementation and applications of data structures
2. To compare alternative implementations of data structures
3. To compare the benefits of static and dynamic data structures
4. To choose the appropriate data structure for -nodeling a given problem

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Unit : I : Linked Lists

Concept of linked organization, Singly linked list, Operations such as Insertion, deletion, inversion, concatenation, Computation of length, traversal on linked list, Applications: Representation and manipulations of polynomials using linked lists, Representation of sparse matrix using linked organization, Linked Stacks and Queues, circular linked list, doubly linked list and dynamic storage management. Representation of polynomial/set using generalized linked list, Dynamic memory management: Garbage collection and Compaction. (8 Hrs)

Unit : II : Trees

Review of basic terminology, binary trees and its representation using sequential and linked organization, full and complete binary trees, converting tree to a binary tree, binary tree traversals (recursive and non recursive), operations such as copy, equal etc, Threaded binary trees, Insertion and deletion of nodes in in-order threaded binary tree, preorder, in-order and post order traversals of in-order threaded binary tree, applications of binary trees: Gaming, Expression and decision trees (8 Hrs)

Unit : III : Graphs

Review of basic terminology, Representation of graphs using adjacency matrix, adjacency list and adjacency Multilist, Traversals: Depth First and Breadth First, Connected components and spanning trees, Kruskal's and Prim's algorithms for minimum spanning tree, Algorithm for shortes! path and topological sorting (8 Hrs)

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Unit : IV : Symbol Tables

Notion of a symbol table, representation, static tree tables and dynamic tree tables

Hash Tables : Hash Tables, Hash Functions: Division and Multiplication methods, Collusion Resolution Strategies: Chaining and

Open addressing, Table Overflow: Expansion and extendible hashing.
(8 Hrs)

Unit V : Heaps

Concept, Binary Heaps: Operations, Applications: The selection problem, Event simulation etc., Introduction to d-Heaps, Leftist and skew Heaps.

Indexing : (Implementation not expected for all the following topics of this unit)

Indexing Techniques: Hashed indexes, Tree indexing- B-trees, B+ Trees and Trie Indexing. Introduction of Top-down Splay Trees, Red - black trees, AA trees, k-d trees
(8 Hrs)

Unit VI : Files

External storage devices, Files: Definition and concepts, File organization: Sequential files, random, linked, inverted and cellular partitions. Processing of sequential, Index-sequential and direct files.
(8 Hrs)

Text Books

1. E. Horowitz, S. Sahni, D. Mehta "Fundamentals of Data Structures in C++", Galgotia Book Source, New Delhi, 1995, ISBN 16782928.
2. M. Weiss, "Data Structures and Algorithm Analysis in C++", 2nd edition, Pearson Education. 2002, ISBN-81-7808-670-0

Reference Books

1. A. Drozdek, "Data Structures in C++", 2nd Edition, Thomson Brookes /COLE Books, 2002, ISBN 981 -240 - 079 - 6.
2. A. Michael Berman, "Data structures via C++", Oxford University Press, 2002, ISBN-0-19-510843-4.
3. Y. Langsam, M. Augenstin and A. Tannenbaum, "Data Structures using C and C++", 2nd Edition, Prentice Hall of India, 2002, ISBN-81-203-1177-9.
4. J. Tremblay, P. Soresan, "An introduction to data structures with Applications", 2nd edition, Tata McGraw-Hill International Editions, 1984, ISBN-0-07-462471-7.
5. M. Folk, B. Zoellick, G. Riccardi, "File Structure An Object oriented approach with C++", Pearson Education, 2002, ISBN 81 - 7808 - 131 - 8.

Teaching Scheme Lectures: 3 Hrs/week

210251 : COMPUTER GRAPHICS

Teaching Scheme Examination Scheme

Lectures: 3 Hrs/week Theory: 100 Marks

Prerequisite : Knowledge of C Programming and Basic Data Structures

Learning Objectives

1. To understand basic concepts of computer graphics
2. To understand algorithms to draw various graphics primitives
3. To understand 2-D and 3-D transformations

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Unit I :

Introduction to computer graphics, lines, line segments, vectors, pixels and frame buffers, vector generation, DDA and Bresenham's line and circle drawing algorithms, antialiasing, thick lines, character generation: Stroke Principle, Starburst Principle, Bit map method, display of frame buffer.

Graphics Primitives : Display devices, Interactive devices: Tablets, touch panels, mouse, joysticks, track balls, light pen etc., Data generating devices: Scanners and digitizers, primitive operations, display file structure, algorithms and display file interpreter, Text and line styles. (6 Hrs)

Unit II :

Introduction, representation, entering Polygons, Polygon filling: Seed fill, Edge fill, scan conversion algorithm, filling with patterns.

2D Transformations : Introduction, matrices, Scaling, Rotation, homogeneous coordinates, Translation, Co-ordinate transformation, rotation about an arbitrary point, inverse transforms and shear transforms (6 Hrs)

Unit III :

Introduction, segment table, segment creation, deletion, renaming. Image transformations, raster techniques

Windowing and Clipping : Introduction, viewing transforms, 2D clipping, Cohen-Sutherland outcode algorithm, Polygon Clipping, Sutherland-Hodgman algorithm, Generalized clipping. (6 Hrs)

Unit IV : 3-D Transformations

Introduction, 3-D geometry, primitives, transformations, Rotation about an arbitrary axis, Concept of parallel and perspective projections, Viewing parameters, 3D clipping, 13D viewing transformations (6 Hrs)

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Unit V :

Introduction, Back-face removal algorithm, Z buffers, scan-line, Painters algorithm, Warnock algorithm, hidden line methods, binary space partition.

Light, Color and Shading : Introduction, Diffused illumination, point source illumination, shading algorithm, reflections, shadows, ray tracing, Colour models and tables, shading algorithm, transparency (6 Hrs) **Unit VI : Curves and Fractals**

Introduction, Curve generation, Interpolation, interpolating algorithms, interpolating polygons, B-Splins and corners, Bezier curves, Fractals, fractal lines and surfaces
(With complete mathematical treatment of this unit) (6 Hrs)

Text Books

1. S. Harrington, "Computer Graphics", 2nd Edition, McGraw-Hill Publications, 1987, ISBN 0 - 07 -100472- 6.
2. D. Rogers, J. Adams, "Mathematical Elements for Computer Graphics", 2nd Edition, Tata McGraw-Hill Publication, 2002, ISBN 0 - 07 - 048677 - 8.

Reference Books

1. D. Rogers, "Procedural Elements for Computer Graphics", 2nd Edition. Tata McGraw-Hill Publication, 2001, ISBN 0 - 07 - 047371 - 4.
2. J. Foley, V. Dam, S. Feiner, J. Hughes, "Computer Graphics Principles and Practice", 2nd Edition, Pearson Education, 2003, ISBN 81 - 7808 - 038 - 9.
3. F. Hill, "Computer Graphics: Using OpenGL", 2nd Edition, Pearson Education, 2003 ISBN 81 - 297 -0181 - 2.
4. D. Hearn, M. Baker, "Computer Graphics - C Version", 2nd Edition, Pearson Education, 2002, ISBN 81 - 7808 - 794 - 4.

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210252 : COMPUTER ORGANIZATION

Teaching Scheme Examination Scheme

Lectures: 3 Hrs/Week Theory: 100 Marks

Pre requisites : Digital Electronics and Logic Design (Subject Code: 210243)

Learning Objectives

1. To understand the structure, function and characteristics of computer systems
2. To understand the design of the various functional units of digital computers

Unit I :

Brief History of computers, Von Neumann Architecture, Functional Units, Bus structures and Interconnection networks, Performance (3 Hrs)

Data Types and Computer Arithmetic : Scalar Data Types, Fixed and Floating point numbers, Signed numbers, Integer Arithmetic, 2's Complement multiplication, Booths Algorithm, Hardware Implementation, Division, Restoring and Non Restoring algorithms, Floating point representations, IEEE standards, Floating point arithmetic (4 Hrs)

Unit II : Control Unit Design

Machines instructions and addressing modes, Single Bus CPU, Control Unit Operation: Instruction Sequencing, Micro-operations, (Register Transfer).

Hardwired Control: Design methods, Design Examples: Multiplier CU.

Micro-programmed Control: Basic concepts, Microinstruction-sequencing and execution, Micro-program control, Applications of microprogramming, Emulator (6 Hrs)

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Unit III : Processor Design

CPU Architecture, Register Organization, Instruction Set - Instruction types, instruction formats (Intel, Motorola processors), Instruction cycles, Instruction pipelining, Types of operands, Addressing Modes (Intel, Motorola processors), ALU design-ALU organization. (6 Hrs)

Unit IV : Memory Organization

Characteristics of memory systems. Internal and External Memory, chip packaging.

Main Memory- ROM, PROM, EPROM, EEPROM, RAM: SRAM, DRAM, SDRAM, RDRAM, error correction

High-Speed Memories : Cache Memory, organization and Mapping, Replacement Algorithms, Cache Coherence, MESI protocol. Interleaved and Associative Memories, Performance Characteristics, Virtual Memory: Main Memory allocation, Segmentation, Paging • Secondary Storage: Magnetic Disk, Tape, DAT, RAID, Optical memory, CDROM, DVD (6 Hrs)

Unit V : I/O Organization

Input/Output Systems, Programmed I/O, Interrupt Driven I/O, I/O channels, Direct Memory Access (DMA), Buses and standard Interfaces: Synchronous, Asynchronous, Parallel, Serial, PCI, SCSI, USB Ports

Peripherals: Keyboard, Mouse, Scanners, Video Displays, Dot Matrix, Desk-jet and Laser Printers (6 Hrs)

Unit VI : Multiprocessor Configurations

Closely coupled and loosely coupled multiprocessor architectures, Problems of bus contentions, Inter-process Communications, Coprocessor and I/O Processor, Bus controller, Bus Arbitration, System Bus, Uni-bus, Multi-bus.

RISC and SUPERSCALAR Processors: RISC-Features, Register File, RISC v/s CISC, Superscalar Processors- Overview, Organization (6 Hrs)

Text Books

1. C. Hamacher, V. Zvonko, S. Zaky, "Computer Organization", McGraw Hill, 2002
2. W. Stallings, "Computer Organization and Architecture: Designing for performance", 6th Edition, Prentice Hall of India, 2003, ISBN 81-203-2103-0
3. J. Hays, "Computer Architecture and Organization", 2nd Edition, McGraw-Hill, 1988 ISBN 0 - 07 -100479-3

Reference Books

4. W. Stallings William, "Computer Organization and Architecture: principles of structure and function", 2nd Ed, Maxwell Macmillan Editions, 1990 ISBN 0 - 02 -946297 - 5 (Chapter: 2,3,4,5,7,8,9,10,11,12,13,14).
5. A. Tanenbaum, "Structured Computer Organization", 4th Ed, Prentice Hall of India, 1991 ISBN 81 - 203 -1553 - 7 (Chapter: 1,4,5,6,8).
6. G. George, "Computer Organization: Hardware and Software", 2nd Edition, Prentice Hall of India, 1986 (Chapter: 3,4,5).

7. D. Paterson, J. Hennesy, "Computer Organization and Design: The Hardware Software Interface", 2nd Edition, Morgan Kauffman, 2000 ISBN 981 - 4033 -588.

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210253 : OBJECT ORIENTED PROGRAMMING AND GRAPHICS LABORATORY

Teaching Scheme	Examination Scheme
Theory: 2 Hrs/Week	Practical: 50 marks
Practical: 2 Hrs/week	Term Work: 50 marks

Introduction to Object Oriented Programming

Introduction to procedural, modular, object-oriented and generic programming techniques, Limitations of procedural programming, Need of object-oriented programming, fundamentals of object-oriented programming: objects, classes, data members, methods, messages, data encapsulation, data abstraction and information hiding, inheritance, polymorphism. (3 Hrs)

Programming with C++

C++: Extensions to C : Variable declarations, global scope, 'const', reference variables, comments, default parameters, function prototypes, function overloading, inline functions, default and constant arguments, 'cin', 'cout', formatting and I/O manipulators, new and delete operators. (2 Hrs)

Classes and Objects : Defining a class, data members and methods, public, private and protected members, inline member functions, static data members, static member functions, 'this' pointer, constructors, destructors, friend function, dynamic memory allocation, array of objects, pointers and classes, class as ADTs and code reuse (4 Hrs)

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Operator Overloading : Introduction, Need of operator overloading, overloading the assignment, binary and unary operators, overloading using friends, rules for operator overloading, type conversions (3 Hrs)

Inheritance and Polymorphism : Concept and need, single inheritance, base and derived classes, friend classes, types of inheritance, hybrid inheritance, member access control, static class, multiple inheritance, ambiguity, virtual base class, polymorphism, virtual functions, pure virtual functions, abstract base class, virtual destructors, early and late binding, container classes (4 Hrs)

Templates : Introduction, Templates: Function template and class template, function overloading vs. function templates, member function templates and template arguments, Introduction to Generic Programming: Introduction to Standard Template Library (STL),

containers, iterators and algorithms, study of container template classes for vectors and stacks and related algorithms
Name Spaces : Introduction, Rules of namespaces (5 Hrs)
Exception Handling : Introduction, syntax for exception handling code: try^atch-throw, Multiple Exceptions, Exceptions with arguments, Introduction to RTTI
Managing Console I/O Operations : Introduction, C++ streams, stream classes, unformatted I/O, formatted I/O and I/O manipulators (2 Hrs)
Files and Streams : Concept of a file, file operations, streams, opening and closing a file, detecting end-of-file, file modes, file pointer, structures and files, classes and files, sequential file processing, Error handling (2 Hrs)

Reference Books
1. R. Lafore, "The Waite Group's Object oriented Programming in C++", 3rd Edition, Galgotia Publications, 2001, ISBN 81-7515-269-9.
2. E. Balaguruswamy, "Object Oriented Programming with C++", Tata McGraw-Hill Publishing Company Ltd, New Delhi ISBN 0 - 07 - 462038 - X.
3. B. Stroustrup, "C++ Programming Language", 3rd Edition, Pearson Education, 1997, ISBN 0 - 201 - 327554

Suggested list of Assignments
Group A
1. Write C++ program for the following.
A bag consists of zero or more objects of the same type. Each object can be described by its color and weight. Design C++ program to create a new object. This can be done in two ways. If the user provides information about color and/or weight of the object to be created then this information will be used to create the object otherwise the object will be created using default values for these attribute(s). Provide a facility to keep track of total number of objects and total weight of objects in the bag at a given time. Also provide facility to delete an object from a bag. Use static variable and functions.
2. Write a C++ program to create a database of personnel information system containing following information: Name, birth-

date, blood group, weight, height, policy number, telephone number, driving license. Design base class with name, Date of Birth, blood group, and another

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base class with height and weight. Design another base class consisting of polkr number and address. Design a derived class using the base classes to store information such as telephone number and driving license number. Also provide facilities for Insertion, Deletion and modification.

3. Define two classes to store distance. One of the classes should store distance in centimeters and meters and other should store distance in feet's and inches. Read two distances, one for each class and compute sum or difference between them as per the user's choice. Display answer in the unit provided by user. Use friend function, function overloading, default values, constructors etc

4. Write a C++ program to perform String operations i. = Equality
== String Copy
+ Concatenation
« To display a string
» To reverse a string
Function to determine whether a string is a palindrome
To find occurrence of a sub-string. Use Operator Overloading.

5. Write C++ program using three classes as
(a) Student's personal information (name, address, phone, birth date etc)
(b) Student's academic information (Xth, Xllth and Graduation)

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(c) Student's other information (project done, seminar, hobbies, sports record)
Use multiple inheritance and print bio-data of a particular student

6. Create a simple "shape" hierarchy. A base class called shape and derived classes called circle, square and triangle. In the base class write a virtual function "draw" and override this in derived classes.

7. Consider a bookshop that sells both books and tapes. Book is having title and number of pages and cost. Tape has time and cost. Using virtual functions, print the required information about book or tape. Use files to store information.

9. Write a C++ program to perform matrix operation using Templates.

Group B

1. Assignments to understand functions available in graphics library such as,

(a) Text and Graphics mode, initialization of graphics mode, graphics drivers, switching between text and graphics mode, error handling.

(b) Color, Color Palette, Aspect ratio, Text: fonts, alignment, size, orientation and justification.

(c) Graphics Primitives: Pixel, Line, Circle, Ellipse, Polygons, Line styles, Bar graphs, Pie Charts, Histograms, filling a polygon, windowing.

(d) Writing a Graphics Editor

2. Write a program to implement algorithm for line and circle drawing.

3. Write a program to implement algorithm for filling a polygon using scan-fill method.
4. Write a program to implement 2-D transformations.
5. Write a program to implement concept of segmentation.
6. Write a program to generate fractals.

- Instructor will frame assignments based on the suggested assignments as given above. Students will submit Term Work in the form of a journal that will include at least 12 assignments. Each programming assignment will consists of pseudo-algorithm, program listing with proper documentation and printout of the output.
- Practical Examination will be based on the term work and questions will be asked to judge understanding of the assignments at the time of the examination.

210254 : MICROPROCESSOR INTERFACING LABORATORY

Teaching scheme
Practical: 4 Mrs/week

Examination scheme
Practical: 50 Marks
Term work: 50 Marks

Suggested List of Assignments **Group A**

1. Write 8086 Assembly language program (ALP) to add array of N numbers stored in the memory.
2. Write 8086 ALP to perform non-overlapped and overlapped block transfer.

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3.Write 8086 ALP to find and count negative numbers from the array of signed numbers stored in memory.

4.Write 8086 ALP to convert 4-digit Hex number into its equivalent BCD number and 5-digit BCD number into its equivalent HEX number. Make your program user friendly to accept the choice from user for :

(a) HEX to BCD
(b) BCD to HEX
(c) EXIT.

Display proper strings to prompt the user while accepting the input and displaying the result.

5.Write 8086 A^LP for the following operations on the string entered by the user.

(a) Calculate Length of the string
(b) Reverse the string
(c) Check whether the string is palindrome or not Make your program user friendly by providing MENU like:

(a) Enter the string
(b) Calculate length of string
(c) Reverse string
(d) Check palindrome
(e) Exit

Display appropriate messages to prompt the user while accepting the input and displaying the result.

6.Write 8086 ALP to perform string manipulation. The strings to be accepted from the user is to be stored in code segment Module_l and write FAR PROCEDURES in code segment Module_2 for following operations on the string:

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(a) Concatenation of two strings
(b) *Compare two strings
(c) Number of occurrences of a sub-string in the given string
(d) Find number of words, characters, number of lines and number of capital letters from the given text in the data segment

Note : Use PUBLIC and EXTERN directive. Create .OBJfiles of both the modules and link them to create an EXE file.

7. Write 8086 ALP to arrange the numbers stored in the array in ascending as well as descending order. Assume that the first location in the array holds the number of elements in the array and successive memory locations will have actual array elements. Write a separate subroutine to arrange the numbers in ascending and descending order. Accept a key from the user.

(a) If user enters 0 = arrange in ascending order.

(b) If user enters 1 = arrange in descending order.

8. Write 8086 ALP to perform multiplication of two 8-bit numbers. Use successive addition and add and shift method.

9. Consider 8086 based Microprocessor system with following specifications:

(a) Memory: 8 Kb Monitor program in EPROM, 8 Kb Scratch Pad RAM, 8 KB Battery back up RAM and 8 Kb Expansion Socket for RAM.

(b) Peripherals: 8255, 8279, 8253 and 8259.

(c) I/O Devices: six 7 Segment Displays and Hex Key Pad.

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Draw the entire system block diagram showing the details of memory decoding, chip selection logic, latches, buffers, system clock, power on RESET, address, data and control lines

10. Write your own Interrupt Service Routine to display your name for 2 minutes. The main program will display the name of your college continuously.

Group B

1. 8255

(a) Write 8086 ALP to convert an analog signal in the range of 0V to 5V to its corresponding digital signal using successive approximation ADC and dual slope ADC. Find resolution used in both the ADC's and compare the results.

(b) Write 8086 ALP to interface DAC and generate following waveforms on oscilloscope, (i) Square wave - Variable Duty Cycle and
frequency.

(ii) Sine wave - Variable frequency, (iii) Ramp wave - Variable direction, (iv) Trapezoidal wave (v) Stair case wave

(c) Write 8086 ALP to rotate a stepper motor for given number of steps at a given angle and in the given direction of rotation based on the user choice such as

(i) If 'C' key is pressed - clockwise rotation, (ii) If 'A' key is pressed - anticlockwise rotation.

(iii) If 'B' is pressed - 1/2 clockwise and Vz
anti-clock wise rotation, (iv) If 'S' key is pressed - stop rotation.
Also write routines to accelerate and de-accelerate the motor.
(d)Write 8086 ALP to print a text message on printer using Centronix parallel printer interface. *Select any two of above assignment

2. 8254

- Write 8086 ALP to program 8254 in Mode 0, modify the program for hardware re-triggerable Mono shot mode. Generate a square wave with a pulse of 1 mS. Comment on the difference between Hardware Triggered and software triggered strobe mode. Observe the waveform at GATE & out pin of 1C 8254 on CRO.

3. 8279

Write 8086 ALP to initialize 8279 and to display characters in right entry mode. Provide also the facility to display

- Character in left entry mode.
- Rolling display.
- Flashing display

4. 8250/51

Perform an experiment to establish communication between 2 microprocessor systems A and B. Interface system A with 8250/51 in asynchronous transmitter mode and interface 8250/51 with system B by initializing 8250/51 in asynchronous receiver mode. Write an ALP to transmit the data from system A and receive the data at system B. The requirements are as follows:

Transmission

- message is stored as ASCII characters in the memory.
- message specifies the number of characters to

be transmitted as the first byte. Reception

- Message is retrieved and stored in the memory.
- Successful reception should be indicated.

5. 8259

Write 8086 APL to interface 8259 in cascade mode (M/S) and demonstrate execution of ISR in following manner:
Main program will display two digits up counter. When slave IRQ interrupt occurs, it clears the counter and starts up counting again. When Master IR1 interrupt occurs, it resets the counter to FFH and starts down counting.

6. Data Acquisition System

Make a paper design of a small data acquisition system such as a "Temperature controller of a furnace" for some industrial process control system. Draw the block diagram showing the CPU, memory and peripheral interfacing. Write technical specifications of your system. TSR Programs

(a) Write a TSR program in 8086 ALP to implement Real Time Clock (RTC). Read the Real Time from CMOS chip by suitable INT and FUNCTION and display the RTC at the bottom right corner on the screen. Access the video RAM directly in your routine.

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(b) Write a TSR program in 8086 ALP to implement Screen Saver. Screen Saver should get activated if the keyboard is idle for 7 seconds. Access the video RAM directly in your routine.

(c) Write a TSR program in 8086 ALP to handle the "Divide by zero" interrupt. Test your program with a small code, which causes the divide by zero interrupt.

(d) Write a TSR program in 'C' that would change the color of the screen every 10 seconds * Select any Two of above assignment

Student will submit the term work in the form of Journal consisting of minimum of 16 experiments with at least seven experiments from Group B. Students should be exposed to theoretical aspects of Computer organization, 8086 programming, peripheral interfacing, DOS interrupts and function calls. Practical examination will be based on the term work and questions will be asked to judge the understanding of assignments performed at the time of examination.

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10255 : DATA STRUCTURES LABORATORY

Teaching Scheme	Examination Scheme
Practical: 4 Mrs/week	Practical : 50 marks
	Term Work: 50 marks

Suggested List of Assignments

1. Write a menu driven program to perform following operations on singly linked list: Create, Insert, Delete, Display, Reverse
2. Create two doubly linked lists. Sort them after creation. Merge these two lists into one list so that the merged list is in sorted order. (No new node should be created.).
3. Represent polynomial as a circular linked list and write a menu driven program to perform addition, multiplication and evaluation.
4. Implement circular queue and double ended queue using linked representation
5. Create binary tree and perform recursive and non-recursive traversals
6. Create binary tree. Find height of the tree and print leaf nodes. Find mirror image, print original and mirror image using level-wise printing
7. Create in-order threaded binary tree and perform traversals
8. Represent graph using adjacency list and perform DFS and BFS
9. Represent graph using adjacency list or matrix and generate minimum spanning tree using Prim's algorithm

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10. Write a C++ program to create a text file, read it and compute frequency of vowels, count words, characters, lines and white space characters and write these results into another text file. Use command line arguments.
11. Write a C++ program to implement a small database *mini project* to understand persistent objects and operations on *sequential files* (eg library information, inventory systems, automated banking system, reservation systems etc.) For example, write a program to create a database for reservation system using information such as Name, sex, age, starting place of journey and destination. Program should have following facilities
    (a) To display entire passenger list
    (b) To display particular record
    (c) To update record
    (d) To delete and sort record

    Use Exception Handling for data verification
12. Implement direct access file. Collision handling to be done by chaining with and/or without replacement

13. Use STL for Sorting and searching with user-defined records such as Person Record (Name, birth date, telephone no), item record (item code, item name, quantity and cost)
14. Write a program to add binary numbers (assume one bit as one number) Use STL stack.
15. Implement Dqueue (Double ended queue) using STL.

S. E. Computer Engg. / 62 Instructions

- Instructor will frame assignments based on the assignments as given above. Students will submit Term Work in the form of a journal that will include at least 16 assignments with minimum of 2 assignments based on STL. Assignments to be implemented in C++ using object oriented features. Each assignment will consists of pseudo-algorithm, analysis, program listing with proper documentation and printout of the output.
- Practical Examination will be based on the term work and questions will be asked to judge understanding of assignments performed at the time of examination.

Reference Books

1. S. McConnell, "Code Complete", WP Publishers and Distributors.
2. J. Roberge, "Data Structures in C++, A Laboratory » Course", D. C. Heath and Company, Lexington MASSACHUSETTS, TORONTO, 1995 ISBN 0-669-34719-1.
3. G. Heileman, "Data Structures, Algorithms and Object oriented Programming", Tata-McGraw-Hill, 2002, ISBN 0 - 07 -048641 - 7.
4. A. Drozdek, "Data Structures in C++", 2nd Edition, Thomson Brookes/COLE Books (Vikas Publishing House, New Delhi), 2002, ISBN 981 - 240 - 079 - 6.

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Guidelines for setting Question Paper at S.E. Revised Syllabus (AH Branches) to the effected from Academic year 2004-2005

1. The Syllabus for all subject in this new curriculum is unitized into six units. Equal weight age shall be given to all units with respect to number of questions and marks allotted as below.
2. Each paper shall consist of two sections - Section I and Section n. Units I through III shall be under section I and Units IV through VI shall be under Section II.
3. Every unit will carry two questions with internal choice/ option offered as below.

Q.I OR Q.2
Q.3 OR Q.4
Q.5 OR Q.6
Q.7 OR Q.8 Q.9 OR Q.10 Q.ll OR Q.12

Section I

Unit I Unit II Unit III

Section II

Unit IV Unit V Unit VI
Marks : 16
Marks : 16
Marks : 18
Marks : 16
Marks : 16
Marks : 18

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