

**Structure of S.E. (Information Technology) 2008 Course
Proposed in year 2009 - 10**

Part – I

| 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 |
| 214442 | Computer Organization | 3 | ---- | 100 | --- | --- | --- | 100 |
| 210243 | Digital Electronics and Logic Design | 4 | ---- | 100 | --- | --- | --- | 100 |
| 214441 | Fundamental of Data structures | 4 | ---- | 100 | --- | --- | --- | 100 |
| 207005 | Humanities and Social Sciences | 3 | ---- | 100 | --- | --- | --- | 100 |
| 214443 | Digital Laboratory | ---- | 4 | ---- | 50 | 50 | ---- | 100 |
| 214444 | Programming Laboratory | --- | 4 | --- | 50 | 50 | --- | 100 |
| 214445 | Communication and Language Lab. | 1 | 2 | --- | 50 | ---- | --- | 50 |
| | Total | 19 | 10 | 500 | 150 | 100 | --- | 750 |
| | Total of Part I (A) | 29 Hrs | | 750 | | | | |

Part– II

| Subject Code No. | Subject | Teaching Scheme Hours / Week | | Examination Scheme | | | | Total Marks | |
|------------------|--|------------------------------|-----------|--------------------|------------|------------|-----------|-------------|--|
| | | Lect. | Pract. | Paper | T/W | Pract. | Oral | Total | |
| 207003 | Engineering Mathematics – III | 4 | --- | 100 | --- | --- | --- | 100 | |
| 214446 | Computer Graphics | 3 | --- | 100 | --- | --- | --- | 100 | |
| 214447 | Processor Architecture & Interfacing | 3 | --- | 100 | --- | --- | --- | 100 | |
| 214448 | Data Structures and Files | 3 | --- | 100 | --- | --- | --- | 100 | |
| 214449 | Data Communication | 3 | --- | 100 | --- | --- | --- | 100 | |
| 214450 | Processor Interfacing Laboratory | --- | 4 | --- | 25 | --- | 50 | 75 | |
| 214451 | Data Structures and Files Laboratory | --- | 4 | --- | 25 | 50 | --- | 75 | |
| 214452 | Objected Oriented Programming and Computer Graphics Laboratory | 1 | 4 | --- | 50 | 50 | --- | 100 | |
| | Total | 17 | 12 | 500 | 100 | 100 | 50 | 750 | |
| | Total of Part II (B) | 29 Hrs | | 750 | | | | | |
| | Grand Total (A) + (B) | 1500 | | | | | | | |

Semester - I
Information Technology
2008 Course

210241: DISCRETE STRUCTURES

Teaching Scheme

Lectures: 4 hrs/week

Examination Scheme

Theory: 100 Marks

Discrete mathematics- the mathematics of integers and of collections of object – underlies the operation of digital computer, and is used widely in all fields of computer science for reasoning about data structures algorithms and complexity. The primary objective of subject is to prepare students mathematically for the study of computer engineering. Topics covered in the course include proof techniques, logic and sets, functions, relations, counting techniques, probability and recurrences. By the end of the course, students should be able to formulate problems precisely, solve the problems, apply formal proof techniques, and explain their reasoning clearly.

Prerequisite: Basic Mathematics

Learning objectives: ... the student will be able to

- Use appropriate set, function, or relation models to analyze practical examples, interpret the associated operations and terminology in context.
- Determine number of logical possibilities and probability of events.
- Learn logic and proof techniques to expand mathematical maturity.
- Formulate problems precisely, solve the problems, apply formal proof techniques, and explain their reasoning clearly.

Unit I :

(8 Hrs)

Sets and Propositions

Sets, Combination of sets, Finite and Infinite sets, Un-countably infinite sets, Principle of inclusion and exclusion, multisets.

Propositions, Conditional Propositions, Logical Connectivity, Propositional calculus, Universal and Existential Quantifiers. Normal forms. methods of proofs. Mathematical Induction.

Unit II :

(8 Hrs)

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.

Unit III :

(10 Hrs)

Relations and Functions

Properties of Binary Relations, Closure of relations, Warshall's algorithm, Equivalence Relations and partitions, Partial ordering relations and lattices, Chains and Anti chains.

Functions, Composition of functions, Invertible functions, 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.

Unit IV : (8 Hrs)

Graphs

Basic terminology, multi graphs and weighted graphs, paths and circuits, shortest path in weighted graph, Hamiltonian and Euler paths and circuits, factors of a graph, planer graph and Travelling salesman problem.

Unit V : (8 Hrs)

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 Prim's algorithms for minimal spanning tree, The Max flow –Min cut theorem (transport network).

Unit VI : (8 Hrs)

Permutations, Combinations and Discrete Probability

Permutations and Combinations: rule of sum and product, Permutations, Combinations, Algorithms for generation of Permutations and Combinations. Discrete Probability, Conditional Probability, Bayes' Theorem, Information and Mutual Information.

Text Books:

1. C. L. Liu and D. P. Mohapatra, "Elements of Discrete Mathematics", SiE Edition, TataMcGraw-Hill, 2008, ISBN 10:0-07-066913-9
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", 3rd Edition, Oxford University Press, ISBN 0-19-850717-8
2. Kenneth H. Rosen, "Discrete Mathematics and its Applications", 6th edition, McGraw-Hill, 2007. ISBN 978-0-07-288008-3
3. E. Goodaire and M. Parmenter, "Discrete Mathematics with Graph Theory", 2nd edition, Pearson Education, 2003 ISBN 81-7808-827-4
4. Semyour Lipschutz & Marc Lipson, "Discrete Mathematics", McGraw-Hill, 3rd Special Indian Edition, ISBN-13 : 978-0-07-060174-1
5. B. Kolman, R. Busby and S. Ross, "Discrete Mathematical Structures", 4th Edition, Pearson Education, 2002, ISBN 81-7808-556-9
6. N. Deo, "Graph Theory with application to Engineering and Computer Science", Prentice Hall of India, 1990, 0-87692-145-4

214442 – COMPUTER ORGANIZATION

Teaching Scheme

Lectures: 3 hrs / week

Examination scheme

Theory: 100 Marks

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.
3. To learn basics of Parallel Computer Architecture.

Unit I :

(8 Hrs)

Computer Evolution & Arithmetic

A Brief History of computers, Designing for Performance, Von Neumann Architecture, Hardware architecture, Computer Components, Interconnection Structures, Bus Interconnection, Scalar Data Types, Fixed and Floating point numbers, Signed numbers, Integer Arithmetic, 2's Complement method for multiplication, Booths Algorithm, Hardware Implementation, Division, Restoring and Non Restoring algorithms, Floating point representations, IEEE standards, Floating point arithmetic.

Unit II :

(8 Hrs)

The Central Processing Unit

Machine Instruction characteristics, types of operands, types of operations, Addressing modes, Instruction formats, Instruction types, Processor organization, Intel 8086 as example, Programmers model of 8086, max/min mode, Register Organization, Instruction cycles, Read Write cycles, 8086 assembly instruction examples to explain addressing modes.

Unit III :

(6 Hrs)

The Control Unit

Single Bus Organization, Control Unit Operations: Instruction sequencing, Micro operations and Register Transfer. Hardwired Control: Design methods – State table and classical method, Design Examples - Multiplier CU. Micro-programmed Control: Basic concepts, Microinstructions and micro- program sequencing.

Unit IV :

(6 Hrs)

Memory Organization

Characteristics of memory systems, Internal and External Memory, Types of memories: ROM: PROM, EPROM, EEPROM, RAM: SRAM, DRAM, SDRAM, RDRAM
High-Speed Memories: Cache Memory, Organization and Mapping Techniques, Replacement Algorithms, Cache Coherence, MESI protocol. Virtual Memory: Main Memory allocation, Segmentation, Paging, Address Translation Virtual to Physical.
Secondary Storage: Magnetic Disk, Tape, DAT, RAID, Optical memory, CDROM, DVD.

Unit V :

(6 Hrs)

I/O Organization

Input/Output Systems, Programmed I/O, Interrupt Driven I/O, 8086 Interrupt structure, Direct Memory Access (DMA), 8237 features Buses and standard Interfaces: Synchronous, Asynchronous, Parallel I/O 8255 features, Serial I/O 8251 features, PCI, SCSI, USB Ports
Working mechanisms of Peripherals: Keyboard, Mouse, Scanners, Video Displays, Touch Screen panel, Dot Matrix, Desk-jet and Laser Printers(features and principles).

Unit VI :**(8 Hrs)****Parallel Organization**

Instruction level pipelining and Superscalar Processors, Multiple Processor Organizations, Closely and Loosely coupled multiprocessors systems, Symmetric Multiprocessors, Clusters, UMA NUMA, Vector Computations,

RISC: Instruction execution characteristics,, RISC architecture and pipelining. RISC Vs CISC.

Text Books

1. W. Stallings, “Computer Organization and Architecture: Designing for performance”, 6th Edition, Prentice Hall of India, 2003, ISBN 81 – 203 – 2962 – 7
2. C. Hamacher, V. Zvonko, S. Zaky, “Computer Organization”, McGraw Hill, 2002, 5th edition ISBN 007-120411-3

Reference Books

1. J. Hays, “Computer Architecture and Organization”, 2nd Edition, McGraw-Hill, 1988 ISBN 0 – 07 – 100479 – 3
2. 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).
3. Tanenbaum, “Structured Computer Organization”, 4th Edition , Prentice Hall of India, 1991 ISBN 81 – 203 – 1553 – 7 (Chapter: 1,4,5,6,8).
4. G. George, “Computer Organization: Hardware and Software”, 2nd Edition, Prentice Hall of India, 1986 (Chapter: 3,4,5).
5. D. Paterson, J. Hennesy, “Computer Organization and Design: The Hardware Software Interface”, 2nd Edition, Morgan Kauffman, 2000

210243 – DIGITAL ELECTRONICS AND LOGIC DESIGN

Teaching Scheme

Lectures: 4 hrs / week

Examination scheme

Theory : 100 Marks

Prerequisites : Basic Electronics Engineering.

Learning Objectives

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

Unit I :

(8 Hrs)

Number System & Logic Design Minimization Techniques

Introduction. Binary, Hexadecimal numbers, Octal numbers and number conversion. Signed Binary number representation. Signed Magnitude, 1's complement and 2's complement representation. Binary, Hexadecimal Arithmetic. 2's complement arithmetic. Algebra for logic circuits : Logic variables; Logic function : NOT, AND, NOR, XOR, OR, XNOR, NAND. Codes : BCD, Excess-3, Gray code , Binary Code and their conversion. Boolean algebra. Truth tables and Boolean algebra. Idealized logic gates and symbols. DeMorgan's rules Axiomatic definition of Boolean algebra, Basic theorems and properties of Boolean algebra.

Unit II :

(6 Hrs)

Logic Families

TTL: Standard TTL characteristics- Speed, power dissipation, fan-in, fan-out, current and voltage parameters, noise margin, operating temperature etc. Operation of TTL NAND gate. TTL Configurations- Active pull-up, Wired AND, totem pole, open collector. CMOS: CMOS Inverter, CMOS characteristics, CMOS configurations- Wired Logic, Open drain outputs. Interfacing: TTL to CMOS and CMOS to TTL.

Unit III :

(8 Hrs)

Combinational Logic

Logic minimization Representation of truth-table, SOP form, POS form, Simplification of logical functions, Minimization of SOP and POS forms, Don't care conditions. Reduction techniques: K-Maps (only up to 4 variables) & Quine – McClusky technique Arithmetic Operations: - Binary Addition, Subtraction, BCD Addition Circuits: - Half- Adder, Full Adder, Half Subtract or, Full Sub tractor, BCD adder using and subtractor using IC 7483, look ahead carry, parity generator and checker using IC 74180, magnitude comparator using IC 7485. Multiplexers (MUX) : Working of MUX, Implementation of expression using MUX (IC 74153, Demultiplexers IC 74151). Demultiplexers (DEMUX):- Implementation of expression using DEMUX, Decoder (IC 74138).

Unit IV :**(8 Hrs)****Sequential Logic**

Introduction: Sequential Circuits. Difference between combinational circuits and sequential circuits

Flip-flop : SR, JK, D, T; Preset & Clear, Master and

Slave Flip Flops their truth tables and excitation tables, Conversion from one type to another type of Flip Flop. Study of 7473,7474,7476

Application of Flip-flops. Bounce Elimination Switch, registers, counters.

Registers : Buffer register; shift register;7495

Counters : Asynchronous counter, Synchronous counter, Ring counters, BCD Counter,Johnson Counter,

Modulus n counter (IC 7490, IC 74191), Pseudo Random Binary Sequence Generator, Sequence generator and detector.

Unit V :**(8 Hrs)****ASM & Programmable Logic Devices**

Algorithmic State Machines,ASM charts, notations, design of simple controller, multiplexer controller method.

Examples. Sequence Generator, Types of Counter.

Programmable Logic Devices:

PLD: PLA- Input, Output Buffers, AND, OR, Invert/ Non-Invert Matrix.

Design Example- Any 4 Variables SOP function using PLDs.

Study of basic architecture of FPGA CPLD.

Unit VI :**(6 Hrs)****VHDL and Introduction to Microprocessors**

Introduction to HDL, VHDL- Library, Entity, Architecture, Modeling Styles, Concurrent and Sequential Statements, Data Objects & Data Types, Attributes.

Design Examples. VHDL for Combinational Circuits-Adder, MUX.

VHDL for Sequential Circuits-Synchronous and Asynchronous Counter. ,Shift Register.

Introduction to Microprocessor. Introduction of Ideal Microprocessor, Data Bus, Address Bus, Control Bus, 8085 Programmers model as an example.

Text Books

1. James Bignell, Robert Donavan "Digital Electronics" 5th edition CENEGAGE Learning ISBN
2. TB 1. R.P.Jain, "Modern Digital Electronics", 3rd Edition, Tata McGraw-Hill, 2003, ISBN 0- 07 - 049492 - 4
3. TB 2. Stephen Brown, Zvonko Vranesic " Fundamentals of Digital Logic with VHDL Design" Mcgraw-Hill

Reference Books

1. John Yarbrough, "Digital Logic applications and Design" Thomson
2. Flyod "Digital Principles", Pearson Education
3. Malvino, D.Leach " Digital Principles and Applications", 5th edition, Tat Mc-Graw Hill
4. J.Bhaskar "VHDL Primer" 3rd Edition, Pearson Edition

214441 – FUNDAMENTAL OF DATA STRUCTURE

Teaching Scheme

Lectures: 4 hrs / week

Examination scheme

Theory: 100 Marks

Prerequisite : Fundamental knowledge of 'C' from 'Fundamentals of Programming Language'.

Learning Objectives

The students shall learn the C language and pointers in depth. They will be able to use pointers for data manipulation. They will learn linear data structures.

Unit I :

(8 Hrs)

Introduction to C

Constants, variables and keywords in C, operators and control structure in c(decision, loop and case), functions, macros, arrays and string manipulation, structure, union, enumeration, bitwise operations.

Unit II :

(8 Hrs)

Arrays & Pointers in C

Functions: Parameter passing call by value and call by reference, scope rules, functions and pointers, function returning pointer and pointer to function, String manipulations using arrays, pointer to pointer.

Structure and Union: Passing and returning structure as parameter for function, structure and pointer.

Recursion: Definition, writing recursive functions & how recursion works. File handling using C.

Unit III :

(8 Hrs)

Introduction to Data structures & Analysis of Algorithms

Introduction to Data Structures: Concept of data, Data object, Data structure, Abstract Data Types (ADT), realization of ADT in 'C'.

Concept of Primitive and non primitive, linear and Non-linear, static and dynamic, persistent and ephemeral data structures.

Analysis of algorithm: frequency count and its importance in analysis of an algorithm, Time complexity & Space complexity of an algorithm, Big 'O', ' Ω ' and ' θ ' notations, Best, Worst and Average case analysis of an algorithm.

Unit IV :

(8 Hrs)

Searching and sorting techniques

Need of searching and sorting, why various methods of searching and sorting, Sorting methods: Linear and binary search.

Sorting methods : Bubble, insertion, selection, merge, quick, bucket, Time complexity of each searching and sorting algorithm.

Unit IV :**(8 Hrs)****Linear data structures using sequential organization**

Concept of sequential organization, Concept of Linear data structures, Concept of ordered list, Storage representations of ordered list such as row major , column major and their address calculation.

Representation of sparse matrix using arrays, application of array in polynomial representation and algorithm for sparse matrix addition, multiplication, simple and fast transpose.

Unit VI :**(6 Hrs)****Linear data structures using linked organization**

Concept of linked organization, singly linked list, doubly linked list, circular linked list. Linked list as ADT. Representation and manipulations of polynomials using linked lists, comparison of sequential linked organization with linked organization, concept Generalized Linked List.

Text Books

1. R. Gilberg, B. Forouzan, "Data Structures: A pseudo code approach with C", Cenage Learning, ISBN 9788131503140.
2. E. Horowitz , S.Sahani, S.Anderson-Freed "Fundamentals of Data Structures in C", Universities Press ,2008 ,ISBN 10:8173716056
3. Yashwant Kanitkar,"Let us C & Pointer in C",BPB Publication

References Books

1. Kernighan and Ritchie, "The C Programming Language", Prentice Hall
2. Tremblay and Sorenson, "An introduction to data structures with applications", Tata McGrawHill, Second Edition

207005 – HUMANITIES AND SOCIAL SCIENCES

Teaching Scheme

Lectures: 3 hrs / week

Examination scheme

Theory: 100 Marks

Learning Objectives

This course will lead to the learning of

1. Human and social development.
2. Contemporary national and international affairs.
3. Emergence of Indian society and Economics.
4. Sectoral development and Economic development and related issues (such as international economics, WTO, RBI, etc).

Unit II : (6 Hrs)

Indian Society

Structure of Indian Society, Indian Social Demography– Social and Cultural, Differentiations: caste, class, gender and tribe; Institutions of marriage, family and kinship- Secularization –Social Movements and Regionalism- Panchayatraj Institutions; Affirmative Action Programme of the Government-various reservations and commissions.

Unit II : (6 Hrs)

Social Development

Scientific approach to the study of human beings. Evolution of human kind, social change and evolution. Industrial revolution. National policy on education, health and health care and human development.

Unit III : (6 Hrs)

Sectoral Development

Agriculture : Technology changes, Green revolutions, Employment Rural and Urban, Government Schemes.
Industrial Development : Strategies, Public and Private Sectors, Categories, infrastructure, transport and communication, Consumer Awareness.

Unit IV : (6 Hrs)

Environment and Ecology

Ecosystems : Structure, Working, components.
Pollution : Water and Air Pollution, Global Warming, Control Strategies, International Treaties.
Energy Sources : Renewable and Non Renewable, Hydro power, Biomass, Ocean, Geothermal and Tidal .
Global Environmental Issues : Population Growth, Soil Degradation, Loss of Biodiversity.

Unit V : (6 Hrs)

Economic Development

Need for planned economic development – Law of demand and supply. Planning objective, five years plan, priorities and problems. Population and development.
Indian Economics – basic features, natural resources population size and composition, national income concepts, micro economics of India, inflation.

Unit VI :**(6 Hrs)****Banking and Trades**

Financial Analysis, Ratios, Cost Analysis, financial Institutions, Finance Commissions, Budget Analysis.

Indian Banking, Role of Reserve bank of India.

International Economy, WTO, International aid for economic growth.

Outcome

Making engineering and technology students aware of the various issues concerning man and society. These issues will help to sensitize students to be broader towards the social, cultural, economic and human issues, involved in social changes.

Methodologies

1. Suitable case studies should be discussed.
2. Student group discussion activity.
3. Social Networking activity.

Reference Books

1. Krugman, "International Economics", Pearson Education.
2. Prakash, "The Indian Economy", Pearson Education.
3. Thursen Gerald, "Engineering Economics", Prentice Hall.
4. C.S. Rao, "Environmental Pollution Control Engineering", New Age International Pvt. Ltd.
5. Rangarajan, "Environmental Issues in India", Pearson Education.
6. University of Delhi, "The Individual & Society", Pearson Education.
7. Wikipedia.org / wiki /social studies.
8. M. N. Srinivas, "Social change in modern India", 1991, Orient Longman.
9. David Mandelbaum, "Society in India", 1990, Popular.

214443 – DIGITAL LABORATORY

Teaching Scheme

Practical: 4 hrs / week

Examination scheme

Practical: 50 Marks

Term Work: 50 Marks

A. Combinational logic design

1. TTL Characteristics (study and write-up only).
2. Design (truth table, K map) and implement 4 bit Code converter.
 - i. Binary to gray and vice versa.
 - ii. BCD to Excess-3 and vice versa.
3. Design (truth table, K map) and implement 4 bit BCD Adder / Subtractor using IC 7483.
4. Realization of Boolean expression using multiplexer IC 74151/74153.
5. Design (truth table, K map) and implement Parity generator / detector using EX-OR gates and IC 74180.

B. Sequential circuit design

1. Design & Implement of SR ,JK flip-flop using discrete gates and T, D flip-flop using Master Slave J-K flip-flop IC 7476.
2. Design (State diagram) and implement 4 bit Up, Down, Controlled Up/Down Ripple counter using master slave JK flip-flop IC 7476.
3. Design (State diagram, state table, K map) and implement 4 bit Up, Down, Controlled Up/Down Synchronous counter using master slave JK flip-flop IC 7476.
4. Design and implement Modulo 'n' counter with IC 7490 and IC 74191.
5. Design (State diagram, state table, K map, Bush table & Bush diagram) and implement Sequence Generator (with & without bushing) using master slave JK flip-flop IC 7476.
6. Design (State diagram, State table, K map) and implement Sequence Detector using master slave JK flip-flop IC 7476.

C. VHDL Programming

Simulation of

1. 4:1 multiplexer using data flow modeling.
2. Full adder with Half adder using structural modeling.
3. D Flip-Flop using behavioral modeling.
4. 3 bit bidirectional shift register.

D. ASM, PALS and FPGA

1. Simple ASM using multiplexer controller method.
2. Implementation of combinational logic using PLAs
3. 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 of which assignment of Group C and 2 assignments from Group D are compulsory .

• 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.

Note : Concern staff member should take care that the Students verify the functionality of the ICs being used.

214444 – PROGRAMMING LABORATORY

Teaching Scheme

Practical: 4 hrs / week

Examination scheme

Practical: 50 Marks

Term work: 50 Marks

This laboratory includes the assignments based on Fundamentals of Data Structures using features of C Language.

List of experiments:

1. Implement set operations using arrays and perform union, intersection, difference, symmetric difference.
2. Implement following Matrix operations:
 - a. addition with pointers to arrays,
 - b. multiplication without pointers to arrays,
 - c. transpose with pointers to arrays,
 - d. saddle point without pointers to arrays.
3. Perform following String operations with and without pointers to arrays (without using the library functions) : a. substring, b. palindrome, c. compare, d. copy, e. reverse.
4. Structure manipulation (for any database like Employee or Bank database) with and without pointers to structures.
5. Accept student information (e.g. RollNo, Name, Percentage etc.).
 - a. Display the data in descending order of Percentage (Bubble Sort).
 - b. Display data for Roll No specified by user (Linear Search).
 - c. Display the number of passes and comparisons for different test cases (Worst, Average, Best case).
6. Accept Mobile user information (e.g. MobileNo, Name, BillAmount etc.).
 - a. Display the data in descending order of MobileNo. (insertion Sort)
 - b. Display the data in ascending order of Name (Selection Sort)
 - c. Display details for Mobileno specified by user (Binary Search)
 - d. Display the number of passes and comparisons for different test cases (Worst, Average, Best case).
7. Implement Quick Sort recursively of the following set of numbers such as 56, - 90, 80, 78, 234, 654, 432, 12, 0, -11.
8. Implement Sparse matrix and perform following operations on it: Addition, Simple Transpose and Fast Transpose.
9. Create a singly linked list with options:
 - a. insert (at front, at end, in the middle),
 - b. delete (at front, at end, in the middle),
 - c. Display,
 - d. Display Reverse,
 - e. Revert the SLL.
10. Accept input as a string and construct a Doubly Linked List for the input string with each node contains, as a data one character from the string and perform:
 - a) Insert b) delete. c) Display forward. d) Display backward.

Reference:

STEVE McCONNEL, “Code complete”

Note : While performing the assignments following care should be taken

1. Proper indenting, coding styles, commenting, naming conventions should be followed.
2. Avoid using global variables as far as possible
3. Use of functions is necessary
4. All Assignments to be implemented using C and Time and Space Complexity is to be verified with theoretical findings.
5. Faculty should prepare a lab manual including standard test cases & should be available for reference to students.

Student should submit term work in the form of a journal based on the above assignments. Practical examination will be based on the term work. Questions will be asked during the examination to judge the understanding of the practical performed at the time of examination. Candidate is expected to know the theory involved in the experiment.

214445 COMMUNICATIONS AND LANGUAGE LABORATORY

Teaching Scheme

Lectures: *1hr/week*.

Practical: *2 hrs / week*

Examination scheme

Term work: *50 Marks*

Learning Objectives

- Provide a sound grammatical and functional framework and systematic practice of key language.
- Present language in relevant and realistic situations.
- Develop an essential Business English vocabulary.
- Integrate pronunciation practice with the main language points.
- Build confidence by developing tactics to help learners control conversations and avoid communication breakdowns.
- Motivate learners with activities to check their progress.
- Encourage learners to talk about their own jobs and experiences.
- Raise awareness of the cultural aspects of business communication.

Overview

This course is designed for students with a limited knowledge of English who now want to communicate simply and confidently in a range of job-related situations. It maximizes study time by focusing on essential language and skills and developing effective learning strategies. Students learn listening, speaking, reading and writing skills with exposure to Business English. It will allow systematic coverage of Grammar & Vocabulary through natural recycling of language. The course will enable students to speak and write simple English in a range of everyday situations as well as communicate effectively in business environment. It will also focus on remedial teaching. The course aims at enabling students to revise, consolidate and extend their command of English grammar and vocabulary.

Teaching methodology in a Language Lab

- Teaching with *one to one* and *one to many* control with the teacher. This facility may be utilised for teaching topics like Grammar, Writing Skills, Vocabulary, Phonetics etc.
- Broadcasting facility could be utilised for conducting both reading and listening comprehension.
- *One to one* as well as *one to many* conversation facility in the software may be utilised for making corrections, remedial teaching and discussions with students.
- Conference grouping could be used for conducting GDs.
- Word chatting.
- Pairing discussion may be used for conducting various activities to improve communication skills.
- Students demonstration.
- Class tests.
- Student monitoring by teacher.
- Audio recording.
- Audio on demand (by students).
- Video on demand (by students).
- Material upload (by teacher for upgradation of teaching material).

1: (4 Hrs)

Vocabulary building

expressions used in day to day situations, word & phrases useful in a professional context, business expressions, abbreviations, telephone language, business idioms, polite requests,

2 : (6 Hrs)

Phonetics

Consonants, vowels, word stress, elementary intonation, Pronunciation practice, General phonetics exercises in language laboratory.

3 : (6 Hrs)

Grammar

Functional Grammar, the tense: structure and use, formation of correct sentences in various situations, common mistakes and how to avoid them, auxiliary verbs and various ways in which each can be used, Reported speech and its use in spoken communication.

4 : (4 Hrs)

Reading & Listening Skills

Reading Comprehension, Listening Comprehension and Discussions based on Listening sessions in groups of 10. Comprehension with various purposes such as finding precise information, interpretation of the information, understanding the gist.

5 : (4 Hrs)

Writing Skills

Business Correspondence: Business Letters, Covering Letters, Minutes of meeting, E-mail Etiquettes, Resume. Technical Writing: Introduction to Technical Writing (Manuals, brochures etc.) Technical Reports.

6 : (4 Hrs)

Communication Skills

Formality and politeness, Body Language, Communication barriers, Planning, preparation, delivery and assessment of activities like: Public Speaking, Presentation Skills, Group Discussion, Interview Skills, Extempore, Expressing agreement or disagreement politely, Telephone etiquettes, Practice in language laboratory, PPT.

7.

Meeting

Purpose, Procedure, Chairmanship, participation, minutes of meeting, Physical arrangements.

8. Group Discussion

Group Dynamics, Purpose, Organization, Group discussion for any 4 technical/non technical topics.

9. Audio Visual aids

Basic Principles and guidelines, types of aids and use, Development of Power Point presentation on any technical or non technical topic with animation, Sound, video etc.

10 Effective Stress Management

Sources of stress, Recognizing stress, Managing emotional and physical stress.

Term work

Term work shall consist of Journal/Reports/Presentations assigned by teacher and home assignments. A minimum of 10 assignments must be completed covering all topics. On topics 1 to 4 must be in a language lab. Group discussions oral presentation must be in batches. It is in the best interest of Institute that students develop the skills and senior Faculty Guest faculty be involved.

Reference Books

1. Krishna Mohan and Banerji Meera: Developing Communication Skills Macmillan India
2. Rutherford A.J. : Communication Skills for Technical Communication. Pearson Education

Semester - II
Information Technology
2008 Course

207003 – ENGINEERING MATHEMATICS - III

Teaching Scheme

Lectures: 4 hrs / week

Examination scheme

Theory: 100 Marks

SECTION I

Unit I: Linear Differential Equations (LDE)

(09 Hours)

Solution of n^{th} order LDE with Constant Coefficients, Method of Variation of Parameters, Cauchy's & Legendre's DE, Solution of Simultaneous & Symmetric Simultaneous DE, Modeling of Electrical Circuits.

Unit II: Complex Variables

(09 Hours)

Functions of Complex Variables, Analytic Functions, C-R Equations, Conformal Mapping, Bilinear Transformation, Cauchy's Theorem, Cauchy's Integral Formula, Laurent's Series, Residue Theorem.

Unit III: Transforms

(09 Hours)

Fourier Transform (FT): Complex Exponential Form of Fourier Series, Fourier Integral Theorem, Sine & Cosine Integrals, Fourier Transform, Fourier Sine and Cosine Transform and their Inverses, Application to Wave Equation. Introductory Z-Transform (ZT): Definition, Standard Properties, ZT of Standard Sequences and their Inverses. Solution of Simple Difference Equations.

SECTION II

Unit IV: Statistics and Probability

(09 Hours)

Measures of Central Tendency, Standard Deviation, Coefficient of Variation, Moments, Skewness and Kurtosis, Correlation and Regression, Reliability of Regression Estimates. Theorems and Properties of Probability, Probability Density Function, Probability Distributions: Binomial, Poisson, Normal and Hypergeometric; Test of Hypothesis: Chi-Square test.

Unit V: Vector Differential Calculus

(09 Hours)

Physical Interpretation of Vector Differentiation, Vector Differential Operator, Gradient, Divergence and Curl, Directional Derivative, Solenoidal, Irrotational and Conservative Fields, Scalar Potential, Vector Identities.

Unit VI: Vector Integral Calculus

(09 Hours)

Line, Surface and Volume integrals, Work-done, Green's Lemma, Gauss's Divergence Theorem, Stoke's Theorem, Applications to Problems in Electro-Magnetic Fields.

Text Books:

1. Peter V. O'Neil, "Advanced Engineering Mathematics", Cengage Learning.
2. Erwin Kreyszig, "Advanced Engineering Mathematics", Wiley Eastern Ltd.

Reference Books:

1. B.V. Raman, "Engineering Mathematics" Tata McGraw-Hill.
2. M. D. Greenberg, "Advanced Engineering Mathematics", 2nd edition, Pearson Education.
3. Wylie C.R. & Barrett L.C., "Advanced Engineering Mathematics", McGraw-Hill, Inc.
4. B. S. Grewal, "Higher Engineering Mathematics" Khanna Publication, Delhi.
5. P. N. Wartikar & J. N. Wartikar, "Applied Mathematics (Volumes I and II)", (Pune Vidyarthi Griha Prakashan, Pune).
6. Thomas L. Harman, James Dabney and Norman Richert, "Advanced Engineering Mathematics with MATLAB", 2nd edition, Brooks/Cole, Thomson Learning.

214446 – COMPUTER GRAPHICS

Teaching Scheme

Lectures: 3 hrs / week

Examination scheme

Theory: 100 Marks

Pre-requisites

1. Computer Programming and basic data structures.
2. Mathematics topics such as analytical geometry, trigonometry, linear algebra and matrices.
3. Knowledge of vector space, Matrices, Dot products and distances.

Learning Objectives

1. Understand the foundations of computer graphics: hardware systems, math basis, light and color.
2. Come to appreciate the complexities of modeling realistic objects through modeling complex scenes using a high-level scene description language.
3. Become acquainted with some advanced topics in computer graphics.
4. The student should gain an expanded vocabulary for discussing issues relevant to computer graphics (including both the underlying mathematics and the actual programming).
5. The student should gain an appreciation and understanding of the hardware and software utilized in constructing computer graphics applications.
6. The student should gain a comprehension of windows, clipping and view-ports in relation to images displayed on screen.
7. The student should gain an understanding of geometric, mathematical and algorithmic concepts necessary for programming computer graphics.

Teaching aid

Faculties should use LCD to demonstrate the concept of Graphics.

Introduction

Unit I :

(6 Hrs)

Basic Concepts

Graphics Primitives: Introduction to computer graphics, Basics of Graphics systems, Raster scan & random scan displays, display processor, display file structure, algorithms and display file interpreter.

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.

Scan conversions, lines, line segments, vectors, pixels and frame buffers, vector generation, DDA and Bresenham's line and circle drawing algorithms*, initialising, thick lines, character generation: Stroke Principle, Starburst Principle, Bit map method, display of frame buffer.

(* Scan conversion algorithms should be given mathematical treatment).

Unit II : (8 Hrs)

2D & 3D Transformations

2D Geometric Transformations, Basic transformations- translation, scaling, rotation, other transformations such as reflection, shearing, matrix representation and homogeneous coordinate system, Composite transformation, 3D transformation Polygon filling methods.

Unit III : (8 Hrs)

3D Viewing & 3D object representation

Projections, Specifying an arbitrary 3D View, Examples of 3D viewing .Polygon surfaces, polygon tables, plane equation, polygon meshes, curved lines & surfaces, quadric surfaces, Spline representation.

Unit IV : (5 Hrs)

Color models & animation

Colors spaces : RGB, HSV, CMY(K), YIQ, Color Mixing.
Computer Animation : Animation sequences ,functions & Languages, Key-frame systems, Motion Specifications.

Unit V : (6 Hrs)

Ray Tracing

Ray tracing methods, algorithms, ray surface intersection calculations. Transformation, Hierarchy, Local Illumination and shading.

Unit VI : (5 Hrs)

Advanced Topics

Rendering equation and Monte Carlo methods, anti-aliasing, texture mapping, shadows, GPU, Bezier curves, Fractals, fractal lines and surfaces(With complete mathematical treatment of this unit)

Interactive Graphics & usage of at least two tools of computer graphics (3D studio, Maya, Similar tools) (Usage of tools in Lab).

Text Books

1. Steven Harrington,"Computer Graphics A Programming approach",Tata McGraw Hill.
2. M Paulin Baker,"Computer Graphics", Pearson Education.

Reference Books

1. Davis Rogers,"Procedural Elements for Computer Graphics", Tata McGraw Hill
2. Foley and Van Dam,"Computer Graphics:Principles and Practice", Pearson Education
3. F.S. Hill JR,"Computer Graphics Using Open GL". Pearson Education
4. Amarendra N Sinha, Arun D Udai,"Computer Graphics", Tata McGraw Hill

214447 – PROCESSOR ARCHITECTURE AND INTERFACING

Teaching Scheme

Lectures : 3 hrs / week

Examination scheme

Theory : 100 Marks

Prerequisites : Computer Organization

Learning Objectives

1. To learn the architecture and assembly language programming of 80386 Microprocessor.
2. To provide insight to DOS and BIOS and their functions.
3. To study architecture and programming 8051 micro-controllers.

Unit I :

(8 Hrs)

Introduction to 80X86 Processors

16/32bit processor 80x86, 80386 Features and Architecture, Pin Description, Functional Description, Register Set , 80386 Real mode, Segmentation
Bus Cycles Initialization and configuration, Bus operations , Address pipelined ,
Memory organization and I/O organization, 16/32 bit transfer.

Unit II :

(8 Hrs)

Assembly Language Programming

Introduction to assembly language programming, Instruction set, Assembler, linker, loader, concepts, Assembler directives, file I/O processing, Far and near procedures, macros, Timing and delay loops, DOS internal, DOS calls, .EXE, .COM files, Interfacing with 8086: Programmable parallel ports, 8255 A PPI, interfacing, keyboard & display, parallel printer interface, interfacing RAM.

Unit III :

(6 Hrs)

Protected Mode

Segmentation- support registers, related instructions descriptors, memory management through segmentation, logical to linear/physical address translation, protection in segmentation, Privilege instructions.

Paging - support registers, descriptors, linear to physical address translation, TLB, page level protection, virtual memory, .entering into PM mode and returning back to RM mode.

Unit IV :

(6 Hrs)

Multitasking, Interrupts, Exceptions and I/O

Inter-privilege level transfer using Call gates and confirming code segment.

Multitasking - Support registers, related descriptors, Task switching, I/O permission bit map.

Virtual Mode - features, address generation, privilege level, instructions and registers available, entering and leaving V86 mode.

Interrupt structure - Real, Protected and Virtual 8086 modes, Comparison of all three modes

Unit V : (6 Hrs)
Microcontroller

Microcontroller 8051 Architecture, On-Chip data memory and program memory organization - Register set, Register bank, SFRs, External data memory and program memory, Interrupts structure and Response.

Unit VI : (6 Hrs)
Microcontroller

Timers and their programming, Serial port and programming, Other features, Design of minimum system using 8051 micro-controller for various applications. Features of PIC 16C, PIC 16F8XX ,Texas MSP 430.

Text Books

1. Turley, "Advanced Programming of 80386 "
2. Douglas V Hall., "Microprocessors and Interfacing"
3. Ayala , "The 8051 Micro Controller 3rd Edition", IE

Reference Books

1. Tribel Singh, "8088 /8086 Processor", PHI
2. Mazidi M.Gillipse J. "The 8051 Microcontroller and Embedded Systems", Pearson education,2002,ISBN-81-7808-574-7
3. Intel 8 bit Microcontroller manual.
4. Deshmukh A., "Microcontrollers - Theory and Applications", Tata McGraw-Hill, 2004, ISBN 0-07-058595-4

214448 – DATA STRUCTURES AND FILES

Teaching Scheme

Lectures: 3 hrs / week

Examination scheme

Theory: 100 Marks

Learning objectives

The students should be capable of applying appropriate data structures for any given application.

Unit I : (8 Hrs)

File organization

C Files and command line argument, Primitive operations and implementation in C, Concept of sequential, simple Index file and direct access file , Hashing, Hashing function and it's characteristics, Concept of collision resolution, linear probing, chaining with & without replacement, rehashing, Processing of sequential, Index-sequential and direct files.

Sequential file organisation, direct file organisation, index sequential file organisation and their implementation.

Unit II : (6 Hrs)

Stack

Concept of stack as ADT, Implementation of stacks using linked and sequential organization. Concept of multistacks, Importance of stack in recursion, Importance of implicit and explicit stack Application of stacks.

Unit III : (6 Hrs)

Queues

Concept of queues as ADT, Implementation of linear and circular queue using linked and sequential organization. Concept of multiqueues, dequeue and priority queue. Application of queues.

Unit IV : (6 Hrs)

Tree

Difference in linear and non-linear data structure, Trees and binary trees-concept and terminology. binary tree as an ADT. Algorithm for tree traversals (recursive and non recursive). Conversion of general tree to binary tree. Binary search trees, Concept of threaded binary tree. Threaded binary tree as an ADT. Preorder, Inorder traversals of inorder threaded binary search tree.

Unit V : (6 Hrs)

Graphs

Graph as an ADT, Representation of graphs using adjacency matrix, adjacency list, Depth First Search and Breadth First Search. Algorithms for minimal spanning tree (Prim's and Kruskal's)and shortest path- Dijkstra's algorithm Application of these algorithms.

Unit VI : (6 Hrs)

Symbol Tables and Dynamic Trees

Notion of Symbol Table, AVL Trees, OBST, Heap data structure its application in heap sort, Huffman's algorithm,

Hash Tables: Basic concepts, hash function, hashing methods, collision resolution, bucket hashing.

Text Books

1. R. Gilberg, B. Forouzan, "Data Structures: A pseudo code approach with C", Cengage Learning, ISBN 9788131503140.
2. A. Michael Berman, "Data structures via C++", Oxford University Press, 2002, ISBN-0-19-510843-4.

Reference Books

1. E. Horowitz, S. Sahni, D. Mehta "Fundamentals of Data Structures in C++", Galgotia Book Source, New Delhi, 1995, ISBN 16782928.
2. Y. Langsam, M. Augenstein and A. Tannenbaum, "Data Structures using C and C++", 2nd Edition, Prentice Hall of India, 2002, ISBN-81-203-1177-9.
3. R. Gilberg, B. Forouzan, "Data Structures: A pseudo code approach with C++", Cengage Learning, ISBN 9788131504925.
4. A. Tharp, "File organisation and processing", 2008, Willey India edition, 9788126518685
5. A. Drozdek, "Data Structures in C++", 2nd Edition, Thomson Brookes /COLE Books, 2002, ISBN 981 – 240 – 079 – 6.
6. J. Tremblay, P. Soresan, "An introduction to data structures with Applications", 2nd edition, Tata McGraw-Hill International Editions, 1984, ISBN-0-07-462471-7.
7. M. Folk, B. Zoellick, G. Riccardi, "File Structure An Object oriented approach with C++", Pearson Education, 2002, ISBN 81 – 7808 – 131 – 8.
8. M. Weiss, "Data Structures and Algorithm Analysis in C++", 2nd edition, Pearson Education, 2002, ISBN-81-7808-670-0

214449 – DATA COMMUNICATION

Teaching Scheme

Lectures: 3 hrs / week

Examination scheme

Theory: 100 Marks

Learning Objectives

1. Fundamentals of data communications.
2. Basic Network configurations.
3. Understanding the differences between data communications and telecommunications.
4. Practical examples of networks such as
 - Fundamentals of communications media.
 - Hardware configurations within networks.
 - Data transmissions.

Unit I :

(8 Hrs)

Layer Models and Signals

Layered Tasks : Sender, Receiver, And Carrier, Hierarchy.

The OSI Model : Layered Architecture, peer-to-peer Processes, Encapsulation Layers In The OSI Model.

TCP/IP Protocol Suite.

Addressing : Physical &logical Addresses, Port Addresses, Specific Addresses.

Analog And Digital : Analog And Digital Data, Analog And Digital Signals, Periodic And Non-periodic Signal.

Periodic Analog Signals: Sine Wave, Phase, Wavelength, Time And Frequency Domains, Composite Signals,Bandwidth.

Digital Signals : Bit Rate ,bit Length, Digital Signal as a Composite Analog Signal, Transmission Of Digital Signals.

Transmission Impairment: Attenuation, Distortion, Noise.

Data Rate Limits: Noiseless Channel: Nyquist Bit Rate, Noisy Channel: Shannon Capacity, Using Both Limits.

Performance : Bandwidth, Throughput, Latency (delay), Bandwidth-delay Product, Jitter.

Digital-to-digital Conversion: Line Coding, Line Coding Schemes, Block Coding, Scrambling.

Analog to digital Conversion: Pulse Code Modulation (PCM), Delta Modulation (dm).

transmission modes: parallel transmission, serial transmission

Unit II :

(6 Hrs)

Modulation And Multiplexing

Digital-to-analog Conversion: Aspects Of Digital-to-Analog Conversion, Amplitude Shift Keying, Frequency Shift Keying, Phase Shift Keying, Quadrature Amplitude Modulation

Analog-to-analog Conversion: Amplitude Modulation, Frequency Modulation, , Phase Modulation Multiplexing; Frequency-Division Multiplexing, Wavelength-Division Multiplexing Synchronous Time-Division Multiplexing, Statistical Time-Division Multiplexing

Spread Spectrum : Frequency Hopping Spread Spectrum (FHSS), Direct Sequence Spread Spectrum

Unit III :**(6 Hrs)****Transmission Media And Switching**

Guided Media : Twisted-Pair , Coaxial and Fiber-Optic Cable
Unguided Media : Wireless, Radio Waves, Microwaves, Infrared
Circuit-switched Networks : Three Phases, Efficiency, Delay, Circuit-Switched Technology in Telephone Networks
Datagram networks: Routing Table , Efficiency, Delay, Datagram Networks in the Internet
Virtual-circuit networks: Addressing, Three Phases, Efficiency, Delay in Virtual-Circuit Networks, Circuit-Switched Technology in WANs
Structure of a switch: Structure of Circuit Switches, Structure of Packet Switches
Digital Subscriber Line: ADSL, ADSL Lite, HDSL, SDSL, VDSL.

Unit IV :**(6 Hrs)****Error Control And Data Link Control**

Types of errors : Redundancy, detection versus correction, forward error correction versus retransmission, coding , modular arithmetic
Block coding: error detection, error correction , hamming distance, minimum hamming distance
Linear block codes : minimum distance for linear block codes, some linear block codes
Cyclic codes : cyclic redundancy check ,hardware implementation ,polynomials, cyclic code analysis, advantages of cyclic codes
Checksum : idea , one's complement, internet checksum Framing : fixed-size framing, variable-size framing
flow and error control: flow control, error control protocols
Noiseless channels: simplest protocol, stop-and-wait protocol
Noisy channels: stop-and-wait automatic repeat request, go-back-n automatic repeat request , selective repeat automatic repeat request, piggybacking
HDLC: configurations and transfer modes, frames, control field
Point-to-point Protocol: Framing, Transition Phases, Multiplexing, Multilink PPP.

Unit V :**(6 Hrs)****Multiple Access and Ethernet**

Random access : Aloha, Carrier Sense Multiple Access (CSMA), Carrier Sense Multiple Access With Collision Detection (CSMA/CD), Carrier Sense Multiple Access With Collision Avoidance (CSMA/CA)
Controlled access; reservation, polling, token passing
Channelization : Frequency Division Multiple Access (FDMA), Time-Division Multiple Access (TDMA), Code Division Multiple Access (CDMA)
ETHERNET :IEEE standards, data link layer, physical layer
Standard Ethernet : MAC Sub-layer, Physical Layer
bridged Ethernet, switched Ethernet, full-duplex Ethernet
Fast Ethernet: MAC Sub-layer, Physical Layer
Gigabit Ethernet : MAC sub-layer, Physical Layer, Ten-gigabit Ethernet

Unit VI :**(6 Hrs)****Devices, Backbone networks and SONET**

Connecting devices: passive hubs, repeaters, active hubs, bridges, two-layer switches routers, three-layer switches, gateway

Backbone networks: bus backbone, star backbone.

Virtual LANs: membership, configuration, communication between switches, IEEE standard , advantages

SONET Architecture : signals, Sonet devices, connections.

Sonet layers: path layer, line layer , section layer, photonic layer, device-layer relationships, Sonet frames : frame, byte, and bit transmission, STS-L frame format, overheads, encapsulation

Text Books

1. Behrouz a Forouzan, "Data Communications and Networking", 4th Edition
2. P. C. Gupta,"Data Communications", PHI

Reference Books

1. William Stallings,"Data & Computer Communications", 7th Edition: PHI Publications
2. Leon - Garcia, Indra Widijaja,"Communication Networks Fundamental Concepts and Key Architectures"
3. Achyut Godbole,"Data Communication Networks",TMGH

214450 PROCESSOR INTERFACING LABORATORY

Teaching Scheme

Practical: 4 hrs / week

Examination scheme

Term Work: 25 Marks

Oral: 50 Marks

Instructions :- The term work of students should be assessed depending on 11 assignment listed as follows.

| GROUP | NO. OF ASSIGNMENT |
|-------|-------------------|
| A | 3 |
| B | 2 |
| C | 2 |
| D | 4 |

Group A: ALP based 8086 Microprocessor

1. Write Assembly language program (ALP) to add array of N numbers stored in the memory.

OR

1. Write ALP to perform non-overlapped and overlapped block transfer.

2. Write 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

i. HEX to BCD ii. BCD to HEX iii. EXIT.

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

3. Write ALP to perform string manipulation to calculate string length and reverse a string. The strings to be accepted from the user is to be stored in code segment Module_1 and write FAR PROCEDURES in code segment Module_2 for following operations on the string:

Concatenation of two strings

Compare two strings

OR

Number of occurrences of a sub-string in the given string

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 .OBJ files of both the modules and link them to create an EXE file.

Group B: Interfacing with 8086/8051

4. (a) Write 8086 ALP to convert an analog signal in the range of 0V to 5V to its corresponding digital signal using either successive approximation ADC or dual slope ADC.
4. (b) Write 8086 ALP to interface DAC and generate following waveforms on oscilloscope,
- (i) Square wave - Variable Duty Cycle and frequency,
 - (ii) Ramp wave - Variable direction,
 - (iii) Trapezoidal wave,
 - (iv) Stair case wave.
- 4.(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.

Any two assignments based on 8086 interfacing (4a-4c)

OR

4. Write ALP to interface 8051 with :

- (a) Interfacing DAC and writing programs to generate triangular, trapezoidal and sine waveforms.
- (b) Interfacing 8/12 bit ADC to 8051 or equivalent and to write a program to find out the average value for 10 readings.
- (c) Interface stepper motor to 8051 and write a program to rotate motor with different step angles and with different speeds.

Any two assignments based on 8051 interfacing (4a-4c)

Group C: File Processing / Dos Commands

5. Write following programs in C using `int86`, `int86x`, `intdos`, `intdosx` functions

To delete a file

To create a directory

Read and display disk information such as Drive, tracks, sectors etc

OR

5. Write ALP to read Boot Sector and Display contents of Boot Sector (use Inline C Code).

6. Write 8086 ALP to perform Encryption and Decryption of a text message.

Program should open, say, FILE1, read the content of FILE1 and encrypt it using suitable encryption key. Store encrypted text along with encryption key in, say, FILE2. Read and display the contents of encrypted file i.e. FILE2. Decrypt the data and store the decrypted data in, say, FILE3. Compare the

contents of FILE1 and FILE3 after decryption. Make your program user friendly with proper screen echoes.

OR

6. Write 8086 ALP to read command line arguments using PSP(Program Segment Prefix) and implement "DOS COPY Command ". Use File Handle function for handling the files. Handle all the errors and display appropriate message if user does not enter proper command line argument.

GroupD: Assignments based on programming 8051 microcontroller.

7. Write a program to add n, 8 bits numbers found in internal RAM location 40H onwards and store results in R6 and R7.

8. Write a program to multiply 16 bit number by 8 bit number and store the result and internal memory location.

9. Write a program for block transfer for internal / external memory.

10. Timer programming :ISR based

Write ALP to generate square wave using Timer interrupt on any port pin.

OR

10. Serial port programming : ISR based

Connect two 8051 Ics using serial ports Send FFH and 00H alternatively to receiver .Output received byte to port1 ,see port1 pin waveform on CRO.

Write ALP to establish communication between two 8051 in asynchronous or synchronous mode.

11. Write ALP to switch from real mode to protected mode and back to real mode. Display an appropriate message in each mode.

214451 – DATA STRUCTURES AND FILES LIBORATORY

Teaching Scheme

Practical: 4 hrs / week

Examination scheme

Termwork : 25 Marks

Practical : 50 Marks

1. Implement all primitive operations on Sequential file in C
2. Implementation of Hash table using array and handle collisions using Linear probing with replacement and Chaining without replacement
3. Represent single variable polynomial as a circular linked list. Accept the terms in the polynomial in any order, i.e. not necessarily in the decreasing order of exponent. Sort while creating polynomial in the decreasing order of exponent and write a menu driven program to perform display, addition, multiplication and evaluation.
4. Implement stack as an abstract data type (ADT) using linked list. Use this ADT for a) infix to prefix conversion, b) infix to postfix conversion, c) evaluation of postfix expression.
5. Consider a scenario for Hospital to cater services to different kinds of patients as
 - a) Serious (top priority), b) non-serious (medium priority), c) General Checkup (Least priority). Implement the priority queue to cater services to the patients.
6. Accept a postfix expression and construct an expression tree and perform recursive and non recursive traversals.
7. Create a binary search tree of mnemonics from assembly language(e.g. add, mult, div, sub etc.) and perform following operations:
 - a) Insert, b) delete, c) depth of the tree, d) search a node, e) Find its mirror image f) Print original g) mirror image level wise.
8. Represent a given graph using adjacency list and perform DFS and BFS Use the map of the area around the college as the graph. Identify the prominent land marks as nodes and perform DFS and BFS on that
9. Represent a given graph using adjacency matrix and find the shortest path using Dijkstra's algorithm. Use the map of the area around the college as the graph. Identify the prominent land marks as nodes and find minimum distance to various land marks from the college as the source.
10. Implement Huffman's algorithm.

References:

Code complete: STEVE McCONNEL

Note: While performing the assignments following care should be taken

1. Proper indenting, coding styles, commenting, naming conventions should be followed.
2. Avoid using global variables as far as possible
3. Use of functions is necessary
4. Faculty should prepare a lab manual including standard test cases & should be available for reference to students.

Student should submit term work in the form of a journal based on the above assignments.

Practical examination will be based on the term work. Questions will be asked during the examination to judge the understanding of the practical performed at the time of examination.

Candidate is expected to know the theory involved in the experiment.

210253: OBJECT ORIENTED PROGRAMMING AND COMPUTER GRAPHICS LABORATORY

Teaching Scheme

Lectures : *1 hr / Week*
Practical : *4 hrs / week*

Examination scheme

Practical : *50 Marks*
Term Work : *50 Marks*

Unit I : (3 Hrs)

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.

Unit II : (2 Hrs)

Programming with 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

Unit III : (4 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

Unit IV : (3 Hrs)

Operator Overloading:

Introduction, Need of operator overloading, overloading the assignment, binary and unary operators, overloading using friends, rules for operator overloading, type conversions

Unit V : (4 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

Unit VI : (5 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

NameSpaces: Introduction, Rules of namespaces

Unit VII : (2 Hrs)

Exception Handling:

Introduction, syntax for exception handling code: try-catch-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

Unit VIII : (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

Text Books:

1. E. Balaguruswamy, "Object Oriented Programming with C++", Tata McGraw-Hill Publishing Company Ltd, New Delhi ISBN 0 – 07 – 462038 – X.
2. Saurav Sahay, "Object Oriented Programming with C++", Oxford.

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. B. Stroustrup, "C++ Programming Language", 3rd Edition, Pearson Education, 1997, ISBN 0 – 201 – 32755 – 4.
3. Joyce Farrell, "Object Oriented Programming with C++", Cengage learning, India Edition.
4. Rajesh Shukla "Object Oriented Programming in C++", Wiley India Edu.

Suggested list of Assignments

GROUP A:

• **Constructor, Destructor:**

1. Create a class named weather report that holds a daily weather report with data members day_of_month, hightemp, lowtemp, amount_rain and amount_snow. The constructor initializes the fields with default values: 99 for day_of_month, 999 for hightemp, -999 for low emp and 0 for amount_rain and amount_snow. Include a function that prompts the user and sets values for each field so that you can override the default values. Write a program that creates a monthly report.

Static member functions, friend class, this pointer, inline code and dynamic memory allocation :

2. Develop an object oriented program in C++ to create a database of the personnel information system containing the following information: Name, Date of Birth, Blood group, Height, Weight, Insurance Policy number, Contact address, telephone number, driving licence no. etc Construct the database with suitable member functions for initializing and destroying the data viz constructor, default constructor, copy constructor, destructor, static member functions, friend class, this pointer, inline code and dynamic memory allocation operators-new and delete.

• **Operator overloading :**

3. Design a Class 'Complex ' with data members for real and imaginary part. Provide default and parameterized constructors. Write a program to perform arithmetic operations of two complex numbers using operator overloading (using either member functions or friend functions).

4. Write a C++ program to perform String operations
 - i. = Equality
 - ii. == String Copy
 - iii. + Concatenation
 - iv. << To display a string
 - v. >> To reverse a string
 - vi. Function to determine whether a string is a palindrome

To find occurrence of a sub-string. Use Operator Overloading
- **Inheritance :**
 5. Design a base class with name, date of birth, blood group and another base class consisting of the data members such as height and weight. Design one more base class consisting of the insurance policy number and contact address. The derived class contains the data members telephone numbers and driving licence number.

Write a menu driven program to carry out the following things:

 - i) Build a master table ii) Display iii) Insert a new entry
 - iv) Delete entry v) Edit vi) Search for a record
- **Templates :**
 6. Write a program in C++ using function template to read two matrices of different data types such as integers and floating point values and perform simple arithmetic operations on these matrices separately and display it.
- **Virtual functions & files :**
 7. Design a base class consisting of the data members such as name of the student, roll number and subject. The derived class consists of the data members subject code, internal assessment and university examination marks. Construct a virtual base class for the item name of the student and roll number. The program should have the facilities.
 - i) Build a master table ii) List a table iii) Insert a new entry
 - iv) Delete old entry v) Edit an entry vi) Search for a record
- **Exception Handling :**
 8. Create a class named Television that has data members to hold the model number and the screen size in inches, and the price. Member functions include overloaded insertion and extraction operators. If more than four digits are entered for the model, if the screen size is smaller than 12 or greater than 70 inches, or if the price is negative or over \$5000 then throw an integer. Write a main() function that instantiates a television object, allows user to enter data and displays the data members. If an exception is caught, replace all the data member values with zero values.

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. Case study of any graphics tool.

- Instructor will frame assignments based on the suggested assignments as given above. Instructors are expected to incorporate variations in above list.
- Students will submit Term Work in the form of a journal that will include at least 13 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