

UNIVERSITY OF MUMBAI

Revised Syllabus of
(Sem. I and II)
At the
M.C.A. degree course

(with effect from the academic year 2007-2008)

Master of Computer Application
First Year Semester – I

Sr.No.	Code	Subject	No. of Periods per Week (60 min each)			Duration of Theory Paper	Marks				
			Lectures	Practicals	Tutorials		Theory Paper	Term Work	Practical	Oral	Total
1	1.1	Programming with C	4	3	-	3	100	25	25	25	175
2	1.2	System Analysis Design	4	-	1	3	100	25	-	-	125
3	1.3	Computer Organization & Architecture	4	-	1	3	100	25	-	-	125
4	1.4	Discrete Mathematics	4	-	1	3	100	25	-	-	125
5	1.5	Principles of Economics and Management	4	-	1	3	100	25	-	-	125
6	1.6	Introduction to Web Technology	4	3	-	3	100	25	25	25	175
		Total	24	6	4		600	150	50	50	850

Master of computer Application
First Year Semester – II

Sr.No.	Code	Subject	No. of Periods per Week (60 min each)			Duration of Theory Paper	Marks				
			Lectures	Practicals	Tutorials		Theory Paper	Term Work	Practical	Oral	Total
1	2.1	Data Structures	4	3	-	3	100	25	25	25	175
2	2.2	Operating System	4	3	-	3	100	25	25	25	175
3	2.3	Financial Management	4	-	1	3	100	25	-	-	125
4	2.4	Computer Graphics	4	3	-	3	100	25	25	25	175
5	2.5	Probability and statistics	4	-	1	3	100	25	-	-	125
6	2.6	Communication and soft skills	4	-	1	3	100	25	-	-	125
		Total	24	9	3	-	600	150	75	75	900

Programming with C

Lecture : 4 Hrs/week

One paper: 100 marks / 3 Hrs duration

Term Work: 25 marks

Practical : 3 Hrs/week

Practical exam: 50 marks

- 1. Introduction to Problem Solving:** **3 Hrs**
Flow charts, Tracing flow charts, Problem solving methods, Need for computer Languages, Sample Programs written in C
- 2. C Language preliminaries:**
C character set, Identifiers and keywords, Data types, Declarations, Expressions, statements and symbolic constants
- 3. Input-Output:**
getchar, putchar, scanf, printf, gets, puts, functions.
- 4. Pre-processor commands:**
#include, #define, #ifdef
- 5. Preparing and running a complete C program:** **3 Hrs**
- 6. Operators and expressions:**
Arithmetic, unary, logical, bit-wise, assignment and conditional operators
- 7. Control statements:** **5 Hrs**
While, do-while, for statements, nested loops, if else, switch, break, Continue, and goto statements, comma operators
- 8. Storage types:**
Automatic, external, register and static variables.
- 9. Functions:** **5 Hrs**
Defining and accessing, passing arguments, Function prototypes, Recursion, Library functions, Static functions
- 10. Arrays:**
Defining and processing, Passing arrays to a function, Multi dimensional arrays.
- 11. Strings:** **6 Hrs**
Defining and operations on strings.
- 12. Pointers:** **7 Hrs**
Declarations, Passing pointers to a function, Operations on pointers, Pointer Arithmetic, Pointers and arrays, Arrays of pointers function pointers.
- 13. Structures:** **6 Hrs**
Defining and processing, Passing to a function, Unions, typedef, array of structure, and pointer to structure
- 14. File structures:**
Definitions, concept of record, file operations: Storing, creating, retrieving, updating Sequential, relative, indexed and random access mode, Files with binary mode(Low level), performance of Sequential Files, Direct mapping techniques: Absolute, relative and indexed sequential files (ISAM) concept of index, levels of index, overflow of handling.
- 15. File Handling:**
File operation: creation, copy, delete, update, text file, binary file.

Syllabus for MCA First Year Semester – I (with effect from the academic year 2007-2008)

Term work/ Practical: Each candidate will submit a journal in which at least 12 practical assignments based on the above syllabus along with the flow chart and program listing will be submitted with the internal test paper. Test graded for 10 marks and Practical graded for 15 marks.

List of Practical

Two programs based on functions.

Two programs based on pointers.

Four programs based on Remaining portion eg. Control statements, Structures and Unions etc. Three programs based on Different File Operations (File Handling)

References :

1. Mastering C by Venugopal, Prasad – TMH
2. Complete reference with C Tata McGraw Hill
3. C – programming E.Balagurusamy Tata McGray Hill
4. How to solve it by Computer : Dromey, PHI
5. Schaums outline of Theory and Problems of programming with C : Gottfried
6. The C programming language : Kernighan and Ritchie
7. Programming in ANSI C : Ramkumar Agarwal
8. Mastering C by Venugopal, Prasad – TMH
9. Let Us C by kanetkar
10. An introduction to data structures with applications, Jean-Paul Trembly and Paul Sorenson, (2nd edition), 1884

SYSTEM ANALYSIS & DESIGN

Lecture : 4 Hrs/week

Practical : 1 Hr/week

One paper: 100 marks / 3 Hrs duration

Practical exam: 25 marks

- 1. Introduction** **3 Hrs**
 - Systems & computer based systems, types of information system
 - System analysis & design
 - Role, task & attribute of the system analyst

- 2. Approaches to system development** **5 Hrs**
 - SDLC
 - Explanation of the phases
 - Different models their advantages and disadvantages
 - o Waterfall approach
 - o Iterative approach
 - o Extreme programming
 - o RAD model
 - o Unified process
 - o Evolutionary software process model
 - Incremental model
 - Spiral model
 - Concurrent development model

- 3. Analysis: investigating system requirements** **4 hrs**
 - Activities of the analysis phase
 - Fact finding methods
 - o Review existing reports, forms and procedure descriptions
 - o Conduct interviews
 - o Observe & document business processes
 - o Build prototypes
 - o Questionnaires
 - o Conduct jad sessions
 - Validate the requirements
 - o Structured walkthroughs

- 4. Feasibility analysis** **4 Hrs**
 - Feasibility study and cost estimates
 - Cost benefit analysis
 - Identification of list of deliverables

- 5. Modeling system requirements** **7 Hrs**
 - Data flow diagrams logical and physical
 - Structured English
 - Decision tables
 - Decision trees
 - Entity relationship diagram
 - Data dictionary

- 6. Design** **7 Hrs**
 - Design phase activities
 - Develop system flowchart
 - Structure chart
 - o Transaction analysis
 - o Transform analysis
 - Software design and documentation tools
 - Hipo chart
 - Warnier orr diagram
 - Designing databases
 - Entities
 - Relationships
 - Attributes
 - Normalization

7. Designing input, output & user interface	4 Hrs
<ul style="list-style-type: none"> • Input design • Output design • User interface design 	
8. Testing	6 Hrs
<ul style="list-style-type: none"> • Strategic approach to software testing • Test series for conventional software • Test strategies for object-oriented software • Validation testing • System testing • Debugging 	
9. Implementation & maintenance	2 Hrs
<ul style="list-style-type: none"> • Activities of the implementation & support phase 	
10. Documentation	3 Hrs
Use of case tools, Documentation-importance, types of documentation	

Books:

1. "Analysis and Design of Information Systems": Senn, TMH
2. System Analysis and Design: : Howryskiewicz, PHI
3. "System Analysis and Design" : Awad
4. "Software Engineering A practitioners Approach": Roger S. Pressman TMH
5. "System Analysis and Design Methods: " Whitten, Bentley
6. "Analysis and Design of Information Systems": Rajaraman, PHI

COMPUTER ORGANIZATION AND ARCHITECTURE

Lecture : 4 Hrs/week

Practical : 1 Hr/week

One paper: 100 marks / 3 Hrs duration

Practical exam: 25 marks

1 DIGITAL LOGIC

6 Hrs

- Boolean Algebra
- Gates
- Combinational Circuits
 - o Implementation of Boolean Functions
 - Algebraic Simplification
 - Karnaugh maps
 - o Multiplexers / Demultiplexers
 - o Decodes / Encodes
 - o Adders : Half, Full
- Sequential Circuits
 - o Flips-Flops: S-R, J-K, D
 - o Registers: Parallel, Shift
 - o Counters: Ripple, Synchronous

2 THE COMPUTER SYSTEM

13 Hrs

- Computer function and Interconnection
 - o Computer functions
 - o Interconnection Structures
 - o Bus Interconnection
- Memory system design
 - o Memory hierarchy and SRAM
 - o Advanced DRAM Organisation
 - o Interleaved memory, Associative memory
 - o Nonvolatile memory
 - o RAID
- Cache memory
 - o Cache memory Principles
 - o Elements of cache design
 - o Improving Cache Performance
- Input/Output
 - o External devices
 - o I/O modules
 - o Programmed I/O
 - o Interrupt-driven I/O
 - o Direct Memory Access
- I/O Channels and Processors

3 CENTRAL PROCESSING UNIT

13 Hrs

- Instruction set: characteristics & functions
 - o Machine Instruction characteristics
 - o Type of Operands
 - o Types of Operations
- Instruction set: addressing modes & formats
 - o Addressing
 - o Instruction Formats
- CPU structure and Function
 - o Processor Organization
 - o Register Organization
 - o Instruction cycle
 - o Instruction Pipelining
- RISC
- Instruction Level Parallelism and Superscalar Processors
 - o Superscalar versus super pipelined
 - o Limitations
 - o Instruction level parallelism and machine parallelism
 - o Instruction issue policy
 - o Register Renaming
 - o Branch Prediction
 - o Superscalar Execution
 - o Superscalar Implementation

- 4 CONTROL UNIT** **6 Hrs**
- Control Unit Operation
 - o Micro-operation
 - o Control of the processor
 - o Hardwired Implementation
 - Microprogrammed Control
 - Basic Concepts
- 5 PARALLEL ORGANISATION** **7 Hrs**
- Microprocessor organizations
 - o Types of parallel Processor Systems
 - o Parallel organizations
 - Symmetric Multiprocessors
 - o Organization
 - Clusters
 - o Cluster Configurations
 - o Cluster computer Architecture

Term work/Practical : Each candidate will submit a journal /assignments in which at least 10 assignments based on the above syllabus and the internal test paper.

References :

- Digital Computer Fundamentals, Bartee C.Thomas, McGraw-Hill International Edition
- Computer Architecture by Nicolas Carter, Schaum's outlines, McGraw-Hill
- Advance Computer Architecture 2nd Edition by Parthsarthy, Thomson
- Computer Organisation by Hamacher C, Zaky S. McGraw Hill
- Computer Organisation and Architecture; Stallings, W Prentice Hall of India, New Delhi
- Computer Architecture, Behrooz Parhami, Oxford University Press
- Computer Fundamentals Architecture & Organisation B. Ram New Age
- Computer Organization I.S.R.D. group Tata McGraw Hill

DISCRETE MATHEMATICS

Lecture : 4 Hrs/week

Practical : 1 Hr/week

One paper: 100 marks / 3 Hrs duration

Practical exam: 25 marks

- 1. Number Systems** **5 Hrs**
 - Decimal Number Systems
 - Binary Number Systems
 - Hexadecimal Number Systems
 - Octal Number Systems
 - o Binary arithmetic

- 2. Propositions and Logical Operations** **8 Hrs**
 - Notation, Connections, Normal forms, Truth tables
 - Equivalence and Implications
 - Theory of inference for statement calculus, Predicate calculus
 - Rules of Logic
 - o Mathematical Induction and Quantifiers

- 3. Sets, Relations and Diagrams** **8 Hrs**
 - Review of set concepts
 - Relations and digraphs
 - Properties of relations
 - Equivalence relations
 - Computer representation of relations and digraphs
 - Manipulation of relations
 - Partially Ordered Sets (Posets)

- 4. Recurrence Relations** **8 Hrs**

Towers of Hanoi, Iterations, Homogeneous linear equations with constant coefficients, particular solution, difference table, finite order differences, Line in a plane in general position

- 5. Groups and applications** **8 Hrs**
 - Monoids, semi groups
 - Product and quotients of algebraic structures
 - Isomorphism, homomorphism, automorphism
 - Normal subgroups, Codes and group codes

- 6. Classification of Languages** **8 Hrs**

Overview of Formal Languages:
Representation of regular languages and grammars, finite state machines

Term work/Assignment: Each candidate will submit a journal /assignments in which at least 10 assignments based on the above syllabus and the internal test paper. Test graded for 10 marks and Practical graded for 15 marks.

References :

1. "Discrete Mathematical Structures" : Tremblay and Manohar, Tata McGraw Hill
2. "Discrete Mathematics": 1st edition by Maggard, Thomson
3. "Discrete Mathematics" : Semyour Lipschutz, Varsha Patil IInd Edition Schaum's Series TMH
4. "Discrete Mathematical Structures" : Kolman, Busby and Ross, Prentice Hall India, Edition 3
5. "Elements of Discrete Structures" : C.L.Liu
6. "Computer Fundamentals" – P.K.Sinha
7. "Discrete Mathematics and its application" – Rosen
8. "Discrete Mathematical Structure" : G. Shankar Rao New Age
9. Fundamental Approach to "Discrete Mathematics Acharjaya D.P. Sreekumar New Age

PRINCIPLES OF ECONOMICS AND MANAGEMENT

Lecture : 4 Hrs/week

Practical : 1 Hr/week

One paper: 100 marks / 3 Hrs duration

Practical exam: 25 marks

1. Introduction to Managerial Economics – Nature and Scope of Managerial Economics, Economic Theory and Managerial Economic, Managerial Economist – Role and Responsibilities 4 Hrs
2. Demand – Law of demand, elasticity of demand, supply function, elasticity if supply, market equilibrium 4 Hrs
3. Demand forecasting – survey methods, evaluation of forecast accuracy
Cost – output relationship. Economies and Diseconomies of scale.
Cost control and cost reduction. Break-even analysis. 4 Hrs
4. Market structures – Perfect and imperfect competition, Monopoly, Oligopoly, Monopolistic Competition, Price Discrimination, Price and Output Decisions under different market structures. Government intervention in pricing. 4 Hrs
5. Management functions, responsibilities of management to society, development of management thought, contribution of F.W.Taylor, Henri Fayol, Elton Mayo, system contingency approaches to management 3 Hrs
6. Nature of planning, decision-making process, management by objectives 3 Hrs
7. Organization structures: functional, product matrix, flat and vertical structures, authority relationships, decentralization and delegation of authority. 3 Hrs
8. Maslow, Herzberg and MacGregor's theory of motivation. 3 Hrs
9. McClelland's achievement motivation, Blanchard's situation leadership theory. 3 Hrs
10. Marketing: Understanding the concept of marketing mix, Product policy, New product development, Product life cycle and new product development, Channels of distribution, Pricing, Advertising and product promotion policies, Marketing research. 8 Hrs
11. Human resource management – selection, training and appraisal and compensation administration. 6 Hrs

Reference books:

1. Principles & Practice of Management : L.M.Prasad
2. Principles of Macroeconomics: Mankiw, Thomson
3. Managerial Economics Varshney Maheshwari, S.Chand
4. Managerial Economics Dean Joel PHI
5. Managerial Economics D.N. Divedi, Vikas Publishing house
6. Managerial Economics Naylor Vernon, Wertz
7. Marketing Management, Rama Swamy, Nama Kumari
8. Essential Management, Koontz 7th Edition
9. International marketing, Francis Cherunilam
10. HR & Personnel Management, Ashwathaappa

INTRODUCTION TO WEB TECHNOLOGY

Lectures: 4 Hrs/week

paper: 100 marks / 3 Hrs duration

Term work: 25 marks

Practical : 3 Hrs/week One

Practical exam: 50 marks

1. Introduction to the Web 5 Hrs
 - History and Evolution
 - Web development cycle
 - Web publishing
 - Web contents
 - Dynamic Web contents

2. Languages and technologies for browsers 5 Hrs
 - HTML, DHTML, XHTML, ASP, JavaScript
 - Features and Applications

3. Introduction to HTML 10 Hrs
 - HTML Fundamentals
 - HTML Browsers
 - HTML tags, Elements and Attributes
 - Structure of HTML code
 - o Head
 - o Body
 - Lists
 - o Ordered List
 - o Unordered List
 - o Definition List
 - o Nesting List
 - Block Level Tags
 - o Block formatting, Heading, Paragraph, Comments, Text alignment, Font size
 - Text Level Tags
 - o Bold, Italic, Underlined, Strikethrough, Subscript, superscript
 - Inserting graphics, Scaling images
 - Frameset
 - Forms
 - An introduction to DHTML

4. Cascading Style Sheets 6 Hrs
 - The usefulness of style sheets
 - Creating style sheets
 - Common tasks with CSS
 - Font Family
 - o Font Metrics
 - o Units
 - Properties
 - Classes and Pseudo classes
 - CSS tags

5. Introduction to ASP 7 Hrs
 - Working of ASP page
 - Variables
 - ASP forms
 - Data types
 - Operators
 - Object hierarchies
 - o ASP Object model
 - Request, Response Object collections
 - ASP Applications
 - o Creating Active Server Page Application
 - o Session Object
 - o Session Collections
 - o Content Collection
 - o Response Object Model

6. JavaScript 7 Hrs
- Introduction
 - Operators, Assignments and Comparisons, Reserved words
 - Starting with JavaScript
 - o Writing first JavaScript program
 - o Putting Comments
 - Functions
 - Statements in JavaScript
 - Working with Objects
 - o Object Types and Object Instantiation
 - o Date object, Math object, String object, Event object, Frame object, Screen object
 - Handling Events
 - o Event handling attributes
 - o Window Events, Form Events
 - o Event Object
 - o Event Simulation
7. Website Design Concepts 5 Hrs
- How the website should be
 - o Basic rules of Web Page design
 - o Types of Website

Reference Books:

1. Web Technologies Achyut S. Godbole, Atul Kahate Tata McGraw Hill
2. Web Tech. & Design C.Xavier New Age
3. Multimedia & Web Technology – Ramesh Bangia
4. HTML : The complete reference – Thomas A. Powel
5. HTML Examples – Norman Smith, Edward
6. ASP 3.0 Programmers Reference – Richard Anderson
7. JavaScript Bible – Danny Goodman

List of Practicals:

1. Create Web Page and apply some block level tags, text level tags
2. Create Web Page and apply background color, text color, horizontal rules and special characters.
3. Create Web Page and include Ordered list, Unordered list, Definite list and Nested list.
4. Create Web Page and include links to
 - a. Local page in same folder.
 - b. Page in different folder
 - c. Page on the Web
 - d. Specific location within document
5. Create Web Page and include images with different alignment and wrapped text
6. Create tables and format tables using basic table tags and different attributes.
7. Create a frameset that divides browser window into horizontal and vertical framesets.
8. Create Web Page and apply style rules.
9. Create Web Page including control structures using JavaScript.
10. Programs based on Event Handling.

DATA STRUCTURES

Lecture : 4 Hrs/week

paper: 100 marks / 3 Hrs duration

Term work: 25 marks

Practical : 3 Hrs/week One

Practical exam: 50 marks

1. SORTING AND SEARCHING TECHNIQUES

Bubble, Selection, Insertion, Shell sorts and Sequential, Binary, Indexed Sequential Searches, Interpolation, Binary Search Tree Sort, Heap sort, Radix sort

Analysis of Algorithms

Algorithm, Pseudo code for expressing algorithms, time complexity and space complexity, O-notation, Omega notation and theta notation.

2. HASHING TECHNIQUES

- Hash function
- Address calculation techniques, Common hashing functions
- Collision resolution
- Linear probing, Quadratic
- Double hashing
- Bucket hashing
- Deletion and rehashing

3. LINEAR LISTS

- Stacks: LIFO structure, create, POP, PUSH, delete stack
- Queues: FIFO structure Priority Queues, Circular Queues, operations on Queues
- Linear List Concept
- List v/s Array, Internal pointer & External pointer, head, tail of a list, Null list, length of a list
- Linked Lists
 - o Nodes, Linked List Data Structure
- Linked Lists algorithms
 - o Create List
 - o Insert Node (empty list, beginning, Middle, end)
 - o Delete node(First, general case)
 - o Search list
 - o Retrieve Node, add node, Remove node, Print List
 - o Append Linked List, array of Linked Lists
- Complex Linked List structures
 - o Header nodes
 - o Circularly-Linked List
 - o Doubly Linked List
 - f Insertion, Deletion
 - o Multilinked Lists
 - f Insertion, Deletion

4. INTRODUCTION TO TREES

- Binary Trees
 - o Travesals (breadth-first, depth-first)
- Expression Trees
 - o (Infix, Prefix, Postfix Traversals)
- General Trees
- Search Trees
- Binary Search Trees

5. HEAPS

- Structure
- Basic algorithms – ReheapUp, ReheapDown, Build heap, Insert, Delete

6. MULTIWAY TREES

- M-way search trees
- B-Trees
 - o Insertion (Inseet node, Search node, Split node, Insert entry)
 - o Deletion (Node delete, Delete entry, Delete mid, ReFlow, Balance, Combine)
 - o Traverse B-Tree
- B-Tree Search

- **GRAPHS**

- Terminology

- Operations (Add vertex, Delete Vertex, Add Edge, Delete Edge, Find Vertex)
- Traverse Graph (Depth-First, Breadth-First)
- Graph Storage Structures (Adjacency Matrix, Adjacency List)
- Networks
 - o Minimum Spanning Tree
 - o Shortest Path Algorithm
 - o (Dijkstra's algorithm, Kruskal's algorithm, Prim's algorithm, Warshall's algorithm)

Term work/Practical : Each candidate will submit a journal /assignments in which at least 10 assignments based on the above syllabus along with the flow chart and program listing. Internal tests to be conducted separately.

1. Data structure – A Pseudocode Approach with C – Richard F Gilberg Behrouz A. Forouzan, Thomson
2. Schaum's Outlines Data structure Seymour Lipschutz Tata McGraw Hill 2nd Edition
3. Data structures & Program Design in C Robert Kruse, C.L.Tondo, Bruce Leung Pearson
4. "Data structure using C" AM Tanenbaum, Y Langsam & MJ Augustein, Prentice Hall India
5. "An Introduction to Structure with application" Jean – Paul Tremblay & Paul Sorenson
6. Data structure & program design in C RL Kruse, BP Leung & CL Tondo Prentice-Hall
7. Data structure &Algorithm Analysis in C Weiss, Mark Allen Addison Wesley

PROGRAM LIST IN DATA STRUCTURES

1. Write a program in C to implement simple Stack, Queue, Circular Queue, Priority Queue.
2. Write a menu driven program that implements singly linked list for the following operations: Create, Display, Concat, merge, union, intersection
3. Write a menu driven program that implements doubly linked list for the following operations: Create, Display, Count, Insert, Delete, Search, Copy, Reverse, Sort
4. Write a menu driven program that implements doubly linked list for the following operations: Create, Display, Concat, merge, union, intersection
5. Write a menu driven program that implements Singly circular linked list for the following operations: Create, Display, Count, Insert, Delete, Search, Copy, Reverse, Sort
6. Write a program in C for sorting methods.
7. Write a menu driven program in C to a.
Create a binary search tree
b. Traverse the tree in Inorder, Preorder and Post Order c.
Search the tree for a given node and delete the node
Write a program in C to implement insertion and deletion in B tree
8. Write a program in C to implement insertion and deletion in AVL tree
9. Write a menu driven program that implements Heap tree (Maximum and Minimum Heap tree) for the following operations. (Using array) Insert, Delete
10. Write a program to implement double hashing technique to map given key to the address space. Also write code for collision resolution (linear probing)
11. Write a program in C to implement Dijkstra's shortest path algorithm for a given directed graph.
12. Write a program in C to insert and delete nodes in graph using adjacency matrix.
13. Write a program in C to implement Breadth First search using linked representation of graph.
14. Write a program in C to implement Depth first search using linked representation of graph.
15. Write a program in C to create a minimum spanning tree using Kruskal's algorithm.
16. Write a program in C to create a minimum spanning tree using Prim's algorithm

OPERATING SYSTEM

Lecture : 4 Hrs/week

paper: 100 marks / 3 Hrs duration

Term work: 25 marks

Practical : 3 Hrs/week One

Practical exam: 50 marks

1. System Software

- Overview of all system softwares :
 - o Operating system
 - o I/O manager
 - o Assembler
 - o Compiler
 - o Linker
 - o Loader

2. Fundamentals of Operating System

- OS services and Components
- Multitasking
- Multiprogramming
- Timesharing
- Buffering
- Spooling

3. Process and Thread Management

- Concept of process and threads
- Process states
- Process management
- Context switching
- Interaction between processes and OS
- Multithreading

4. Concurrency Control

- Concurrency and Race Conditions
- Mutual exclusion requirements
- Software and hardware solutions
- Semaphores
- Monitors
- Classical IPC problems and solutions
- Deadlock
 - o Characterization
 - o Detection
 - o Recovery
 - o Avoidance and Prevention

5. Memory Management

- Memory partitioning
- Swapping
- Paging
- Segmentation
- Virtual memory
 - o Overlays
 - o Demand paging
 - o Performance of Demand paging
 - o Virtual memory concepts
- Page replacement algorithms
- Allocation algorithms

6. I/O Systems

- Principles of I/O Hardware
 - o I/O devices
 - o Device controllers
 - o Direct memory access
- Principles of I/O Software
 - o Goals
 - o Interrupt handlers
 - o Device drivers
 - o Device independent I/O software
- Secondary-Storage Structure
 - o Disk structure
 - o Disk scheduling
 - o Disk management
 - o Swap-space management
 - o Disk reliability
 - o Stable storage implementation
- Introduction to Clock
 - o Clock hardware
 - o Clock software

7. File Systems

- File concept
- File support
- Access methods
- Allocation methods
- Directory systems
- File protection
- Free space management

8. Protection & Security

- Protection
 - o Goals of protection
 - o Domain of protection
 - o Access matrix
 - o Implementation of access matrix
 - o Revocation of access rights
- Security
 - o The security problem
 - o Authentication
 - o One-Time passwords
 - o Program threats
 - o System threats
 - o Threat monitoring
 - o Encryption
 - o Computer-security classifications

9. Linux System

- Linux introduction and file system – Basic features, advantages, installing requirement, basic architecture of UNIX/Linux system, Kernel, Shell.
- Commands for files and directories cd, ls, cp, mv, rm, mkdir, more, less, creating and viewing files, using cat, file comparisons, View files, disk related commands, checking disk free spaces. Essential linux commands. Understanding shells, Processes in linux – process fundamentals, connecting processes with pipes, Redirecting input output, manual help, Background processing, managing multiple processes, changing process priority, scheduling of processes at command, batch commands, kill, ps, who, sleep, Printing commands, grep, fgrep, find, sort, cal, banner, touch, file, file related commands – ws, sat, cut, grep, dd, etc. Mathematical commands – bc, expr, factor, units. Vi, joe, vim editor.
- Shell programming: Shell programming basic, various types of shell, shell programming in bash, conditional and looping statements, case statements, parameter passing and arguments, shell variables, shell keywords, creating shell programs for automate system tasks and report printing, use of grep in shell, awk programming.

Term work/Practicals : Each candidate will submit a journal /assignments in which at least 10 assignments based on the above syllabus along with the flow chart and program listing will be submitted with the internal test paper. Test graded for 10 marks and Practical's graded for 15 marks.

Relevant Books:

1. Operating Systems Achyut S. Godbole Tata McGraw Hill 2nd edition
2. Operating Systems D.M.Dhamdhare Tata McGraw Hill 2nd edition
3. Understanding Operating System : Flynn & Mctloes 4th edition, thomson
4. Operating Systems Design & implementation Andrew S. Tanenbam, Albert S. Woodhull Pearson
5. Operating System Concepts (7th Ed) by silberschatz and Galvin, Wiley, 2000
6. Operating Systems (5th Ed) – Internals and Design Principles by William Stallings, Prentice Hall, 2000
7. Operating System Concepts (2nd Ed) by James L. Peterson, Abraham Silberschatz, Addison – Wesley.
8. Computer Organisation and Architecture (4th Ed) by William Stallings, Prentice Hall India, 1996
9. Modern Operating Systems by Andrew S Tanenbaum, Prentice hall India, 1992
10. UNIX – Sumitabha Das
11. Unix Shell Programming - Yashwant Kanetkar, BPB publications

List of Practical's for Operating System

1. Study of Basic commands of Linux
2. Study of Advance commands of Linux.
3. Study of current directory according to the following arguments:
 - a. Suffix to be replaced b. Replacement suffixThe script should rename each matching file name suffix with replacement suffix. For example: rename txt text will rename the file atxt to atext. However no overwriting of existing files nor renaming of the special directories . and .. is allowed. Hint : You can use the command mv to rename a file.
B) Write a BASH shell script prime which will accept a number b and display first n prime numbers in standard output.
4. Shell scripting using general-purpose utilities.
Eg. A) Write a menu driven shell script which will print the following menu and execute the given task to display result on standard output.

```
MENU
1      Display calendar of current month
2      Display today's date and time
3      Display usernames those are currently logged in the system
4      Display your name at given x,y position
5      Display your terminal number
6      Exit
```
5. Shell programming using filters (including grep, egrep, fgrep)
6. Write a shell script to validate the entered date. (eg. Date format is: dd-mm-yyyy)
7. Write a shell script to check entered string is palindrome or not
8. Write the awk program uncomment.awk which removes any comment from a C program.
You can assume that the C source code contains only syntactically correct comments:
. starting with //, ending with a new line
. starting with /*, ending with */ (can be multi-line)
. nesting of comments is not allowed
Make sure that the number of lines of the C source code is not changed! When a line contains comments only, replace this line with an empty line.
9. Write an awk program using function, which capitalizes each word in a given string.
10. Write a program for process creation using C. (Use of gcc compiler)
11. Use of g++ compiler.

ACCOUNTING & FINANCIAL MANAGEMENT

Lecture : 4 Hrs/week

One paper: 100 marks / 3 Hrs duration

Tutorial : 1 Hr/week

Term work: 25 marks

1. Accounting process and principles, financial, cost and management accounting.
2. Elements of book keeping, Journal, cash and handbook, Book reconciliation statement, Ledger, trial balance, profit and loss accounts, final accounts of proprietary and partnership concern and balance sheet.
3. Cost accounting – Objectives, elements of cost, understanding of the different methods of costing.
4. Financial Management – Meaning, scope and role, a brief study of functional areas of financial management. Introduction to various FM tools : Ration Analysis
 - Meaning
 - Basis of comparison
 - Types of ratios

Fund Flow statement and cash flow statement (without adjustments)

5. Working Capital Management : Theory of Working Capital Management: Introduction, Nature of Working Capital, Concepts and Definitions of Working Capital, Need for Working Capital, Permanent and Temporary Working Capital, Changes in Working Capital, Determinants of Working Capital.
6. Budgeting – budgets, purpose, budgetary control, preparation of budgets, master budget, fixed and flexible budgeting.

Reference Books:

1. "Book Keeping and Accountancy" Choudhari, Chopde
2. "Cost Accounting" : Choudhari, Chopde
3. "Financial Management" Text and Problems : M.Y.Khan, P.K.Jain
4. "Financial Management Theory & Practice" Prasanna Chandra Tata McGraw Hill
5. Managerial Economics & Financial Analysis, Siddiqui S.A. Siddiqui A.S. New Age

COMPUTER GRAPHICS

Lecture : 4 Hrs/week
paper: 100 marks / 3 Hrs duration
Term work: 25 marks

Practical : 3 Hrs/week One
Practical exam: 50 marks

1. Introduction

- What is C.G.?
- Elements of Graphics Workstation
- Video Display Devices, Raster Scan Systems & Random Scan Systems
- Input devices, Graphics Software Coordinate representations
- Display adapters

2. Algorithms

- **Algorithms** : DDA algorithm, Bresenham's line algorithm, Frame buffers, Bresenham's midpoint circle algorithms, midpoint ellipse algorithm, Polynomials and spline curves
- **Filling** : Filled area primitives, Scan-line polygon fill algorithm
- **Inside-Outside tests**
- **Scan-line fill of curved boundary areas**
- **Boundary fill algorithm, Flood fill algorithm**
- **Character Generation**

3. Graphics Primitives

- Primitive Operations
- The display file interpreter
- Display – File structure
- Display control and polygons-polygon representation

4. Attributes of output primitives

- Line attributes : Line type, Line width, Pen and brush options, Line color, Color and grayscale levels.
- Color tables, grayscale, Area-fill attributes-fill styles, pattern fill, soft fill, character attributes, text attributes.

5. Geometric Transformations

- Matrices, Scaling transformations, Sin and Cos Rotation, Homogeneous Coordinates and Translation, Other transformation (Reflection and shear)
- Coordinate Translations, Rotation about an arbitrary point
- Inverse transformations
- Transformation routines
- Reflection & Shearing Transformations

6. 2D Viewing

- The viewing pipeline, Viewing coordinate reference frame, Window to Viewport coordinate transformation, 2D-Viewing functions.
- Clipping operations – point clipping, line clipping, Cohen-Sutherland line clipping, Line Intersection Clipping & Midpoint subdivision algorithm, Cyrus-Beck algorithm, Liang- Barsky line clipping algorithm, character clipping, text clipping, Polygon clipping, Sutherland-Hodgeman polygon clipping.

7. 3D Concepts

- 3D Display methods – Parallel projection, perspective projection, visible line and surface identification
- 3D transformation matrices – Translation, Rotation & Scaling
- Surface rendering
- 3D object representations – Bezier curves and surfaces, B-Spline Curves and Surfaces

8. Visibility, Image and object precision Z-buffer algorithm, A buffer method, Scan line method, Floating horizons.

9. Light, Color and Shading

- Introduction, Diffuse illumination, point source illumination, Specular reflection – The phong illumination model, The Halfway vector.
- Shading algorithms – Constant-Intensity shading, Gouraud shading, Phong shading, Half-tone shading, Dithering techniques
- Colour Models – RGB Colour model, CMY Colour Model, HSV Colour model
- Transparency, Shadows, Ray tracing

10. Fractals

- Introduction, Topological Dimension, Fractal Dimension, Hilbert's curve, Koch Curve, Fractal lines, Fractal surfaces

11. Computer Animation

- Design of animation sequences, general computer animation functions – Raster animations, Key-frame systems, Morphing, Simulating accelerations, Motion specifications, Kinematics and dynamics.

Reference :

1. Computer Graphics – Donald Hearn & M.Pauline Baker, Prentice Hall of India
2. Computer Graphics, Steven Harrington, McGraw Hill
3. Computer Graphics Principles and Practice, J.D.Foley, A.Van Dam, S.K.Feiner & R.I.Philips, Addison Wesley
4. Principles of Interactive Computer Graphics – William M. Newmann, Robert F. Sproull, McGraw Hill
5. Introduction to Computer Graphics J.D.Foley, A.Van Dam, S.K.Feiner & R.I.Philips, Addison Wesley
6. Mathematical elements of Computer Graphics by Rogers
7. Procedural Elements of Computer Graphics by Rogers
8. Computer Graphics for Scientists & Engineers Asthana R.G.S, Sinha N.K. New Age
9. Computer Graphics ISRD Group Tata McGraw Hill

List of Practicals for Computer Graphics to be implemented in C programming language

1. Implementation of Line Drawing algorithms
2. Implementation of Scan-Line Polygon Fill Algorithm
3. Implementation of Circle Drawing Algorithm
4. Implementation of Ellipse Drawing Algorithm
5. Implementation of 2D Transformations
6. Implementation of Line Clipping Algorithms
7. Implementation of Polygon Clipping, character and text Clipping Algorithm
8. Implementation of 3D Transformations
9. Implementation of Character Generation
10. Implementation of Bezier curves, B-Spline Curves
11. Implementation of Visible Surface methods
12. Implementation of Shading Algorithms
13. Drawing a Smiley using Fractals

PROBABILITY AND STATICS

Lecture : 4 Hrs/week

Tutorial : 1 Hr/week

One paper: 100 marks / 3 Hrs duration

Term work: 25 marks

1. Unit I

Sample Space, Events, Axioms of Probability, Probability Space, Probability of Composite Events, Conditional Probability, Bayes Theorem, Independent Events

2. Unit II

Single Random Variable, Distribution and Density Functions, Expectation values, Moments, Definition of Median, Mode. Measure of dispersion, Skewness and Kurtosis. Characteristic and Moment generating functions. Examples of Discrete Random variables (Bernoulli trials, Poisson variables, geometric distribution) and Continuous random variable (Normal distribution, Beta and Gamma distributions)

3. Unit III

Two Random variables. Joint probability distribution and density functions. Marginal and Conditional distributions. Correlation coefficient and ratio. Independent variables. Many random variables. Correlation matrix, Regression.

4. Unit IV

Statistics. Frequency distribution. Geometric and Harmonic mean. Parameter Estimation, Biased and Unbiased Estimators, Efficient Estimator, Optimal Estimator, Sufficient Estimator. Hypothesis testing. Chi Square test. Student t-test.

5. Unit IV

Single server queue. Erlang distribution and Poisson Process. Stationary queue. Non-Erlang arrivals and modification of steady state queue concepts.

Term work/Practicals : Each candidate will submit a journal in which assignments based on the above syllabus and the internal test paper. Test graded for 10 marks and Practical's graded for 15 marks.

Reference

s :

1. Introduction to Probability & Statistics , Menclenhall 12th edition, Thomson
2. Introduction to Probability & Statistics J.Susan Milton, Jesse C. Arnold Tata McGraw Hill
3. Probability and its computer applications : Kishore Trivedi, PHI
4. Schaum's Outlines Probability, Random Variables & Random Process Tata McGraw Hill
5. Fundamental of Mathematical Statistics – S.C.Gupta, V.K.Kapoor

COMMUNICATION & SOFT SKILLS

Lecture : 4 Hrs/week

One paper: 100 marks / 3 Hrs duration

Tutorial : 1 Hr/week

Term work: 25 marks

1.

Communication

Concept and meaning of communication, barriers to communication, methods of communication, techniques to improve communication

2. Summarization

Techniques to summarize a given passage to test comprehension and ability to present written matter in a brief and concise manner.

3. Comprehension and vocabulary

Technical, scientific or general text with multiple-choice question to test analytical skills, comprehension, expression, vocabulary and grammar (synonyms, antonyms, one-word substitution, word formation)

4. Basic official correspondence

Principles of correspondence, languages and style in official letter, formats of letters, (complete-block, modified-block, semi-block) types of letters, (enquiry, replies to enquires, claims and adjustments, application letters with bio-data)

5. Communication in a business organization

Internal (Upward, Downward, Horizontal, Grapevine, Problems, Solutions), External Communication Strategies for conducting successful business meetings. Documentation (notice, agenda, minutes) of meeting.

6. Advanced technical writing

I] Report writing and presentation: Definition and importance of reports. Qualities of reports, language and style in reports, types of reports, formats (letter, memo, project-reports). Methods of compiling data. A computer-aided presentation of a technical project report based on a survey-based or reference-based topic. Topics to be assigned to a group of 8-10 students. The written report should not exceed 20 printed pages.

II] Technical paper writing

III] Writing Proposals

7. Interpersonal skills

Introduction to emotional intelligence, Motivation, Negotiation and conflict-resolution, Assertiveness, leadership, Team-building, Decision-making, Time-management.

8. Interview techniques

Preparing for job interviews, verbal and non-verbal communication during interviews. Observation sessions and role-play techniques to be used to demonstrate interview strategies.

9. Group discussion

Dynamics of Group Behaviour, Techniques for effective participation.

Term Work:

Each student is to appear for atleast one written test during the term. Term work consists of graded answer paper of the test. Presentations, group discussions, report writing, interpersonal skills

Recommended Books

:

1. Business correspondence and report writing, R.C.Sharma & Krishna Mohan, Tata McGraw Hill
2. Business Communication for Managers, Penrose, Thomson
3. Technical Communication 6th Edition, Anderson, Thomson
4. Effective Technical Communication Rizvi, Tata McGraw Hill Publications
5. English for Engineers & Technologists : A skill approach (Books 1 and 2) Course Authors (Humanities and Social Science Division, Anna University, Madras. Orient Longman (Mainly for Comprehension)
6. Technical Writing & Professional Communication, Huckins, Thomas, McGraw-Hill publications. Written Communication, Freeman, Sarah, Orient Longman.