

UNIVERSITY OF MUMBAI
No.UG/260 of 2007

CIRCULAR :-

A reference is invited to the Ordinances, Regulations and Syllabi relating to the Master of Computer Applications (M.C.A.) degree course vide this office Circular No.UG/304 of 2002, dated 20th July 2002 and the Directors of the recognized Institutions concerned and Professor-cum-Director, Institute of Distance Education are hereby informed that the recommendation are made by the Faculty of Technology at its meeting held on 5th April, 2007 has been accepted by the Academic Council at its meeting held on 13th April, 2007 vide item No.4.46 and that, in accordance therewith, the revised scheme of the Master of Computer Applications (M.C.A.) (Sem. I to VI) and revised syllabus of the M.C.A. (Sem. I and II) degree course has been revised as per Appendix and that the same will be brought into force with effect from the academic year 2007-2008.

MUMBAI-400 032

8th June, 2007

for I/c. REGISTRAR

To,

The Directors of the recognized Institutions concerned and Professor-cum-Director, Institute of Distance Education

A.C./4.46/13.04.2007

No.UG/ 260- A of 2007, MUMBAI-400 032

8th June, 2007

Copy forwarded with compliments for information to :-

- 1) The Dean, Faculty of Technology
- 2) The Chairperson, Ad-hoc Board of Studies in Master of Computer Applications.

for I/c. REGISTRAR

Copy to :-

The Director, Board of College and University Development, the Deputy Registrar (Eligibility and Migration Section), the Director of Students Welfare, the Executive Secretary to the Vice-Chancellor, the P.A. to the Pro Vice-Chancellor, and the Registrar and the Assistant Registrar, Administrative sub-center, Raigad for information.

The Officer on Special Duty and Controller of Examinations (10 copies), the Finance and Accounts Officer (2 copies), Record Section (5 copies), Publications Section (5 copies), the Deputy Registrar, Enrolment Eligibility and Migration Section (3 copies), the Deputy Registrar, Statistical Unit (2 copies), the Deputy Registrar (Accounts Section), Vidyanagari (2 copies), the Deputy Registrar, Affiliation Section (2 copies), the Director, Institute of Distance Education, (10 copies) the Director University Computer Center (IDE Building), Vidyanagari, (2 copies) the Deputy Registrar (Special Cell), the Deputy Registrar (PRC) the Assistant Registrar, Academic Authorities Unit (2 copies) and the Assistant Registrar, Executive Authorities Unit (2 copies). They are requested to treat this as action taken report on the concerned resolution adopted by the Academic Council referred to in the above Circular and that no separate Action Taken Report will be sent in this connection. The Assistant Registrar Constituent Colleges Unit (2 copies), BUCT (1 copy), the Deputy Account Unit VI (1 copy), the In-charge Director, Centralize Computing Facility (1 copy), the Receptionist (1 copy), the Telephone Operator (1 copy), the Secretary MIIASA (1 copy), the Superintendent, Post-Graduate Section (2 copies), the Superintendent Thesis Section (2 copies)

UNIVERSITY OF MUMBAI



Revised Scheme
of
(Sem. I to VI)
and 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

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	Programming with C	4	3	-	3	100	25	25	25	175
1.2	System Analysis Design	4	-	1	3	100	25	-	-	125
1.3	Computer Organization and Architecture	4	-	1	3	100	25	-	-	125
1.4	Discrete Mathematics	4	-	1	3	100	25	-	-	125
1.5	Principles of Economics and Management	4	-	1	3	100	25	-	-	125
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

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
2.1	Data Structures	4	3	-	3	100	25	25	25	175
2.2	Operating System	4	3	-	3	100	25	25	25	175
2.3	Financial Management	4	-	1	3	100	25	-	-	125
2.4	Computer Graphics	4	3	-	3	100	25	25	25	175
2.5	Probability and Statistics	4	-	1	3	100	25	-	-	125
2.6	Communication & Soft Skills	4	-	1	3	100	25	-	-	125
	Total	24	9	3		600	150	75	75	900

**Master of Computer Application
Second Year Semester-III**

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
3.1	Objected Oriented Programming C++	4	3	-	3	100	25	25	25	175
3.2	Data Base Management Systems	4	3	-	3	100	25	25	25	175
3.3	Data Communication Networks	4	3	-	3	100	25	25	25	175
3.4	Operation Research	4	-	1	3	100	25	-	-	125
3.5	Software Engineering	4	-	1	3	100	25	-	-	125
3.6	Management Information System	4	-	1	3	100	25	-	-	125
	Total	24	9	3	18	600	150	75	75	900

**Master of Computer Application
Second Year Semester-IV**

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
4.1	Java Programming	4	3	-	3	100	25	25	25	175
4.2	Object Oriented Modeling and Design Using UML	4	3	-	3	100	25	25	25	175
4.3	Network Security	4	-	1	3	100	25	-	-	125
4.4	Advance Database Techniques	4	3	-	3	100	25	25	25	175
4.5	Elective I	4	-	1	3	100	25	-	-	125
4.6	Software Project Management	4	-	1	3	100	25	-	-	125
	Total	24	9	3	-	600	150	75	75	900

Master of Computer Application
Third Year Semester-V

Sl. 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
1	5.1	Multimedia	4	-	1	3	100	25	-	-
2	5.2	Wireless Technology	4	3	-	3	100	25	25	25
3	5.3	Distributed Computing	4	-	1	3	100	25	-	-
4	5.4	Advance Web Technologies	4	3	-	3	100	25	25	25
5	5.5	Elective 2	4	-	1	3	100	25	-	-
6	5.6	Foreign language	4	-	1	3	100	25	25	25
Total			24	6	4	-	500	150	50	100

Master of Computer Application
Third Year Semester-VI

Sl. No.	Code	Subject	No. of Periods per Week (60 min each)			Duration Of Theory Paper	Marks			
			Lectures	Practicals	Tutorials		Project Report	Term Work	Presentati on	Oral
1	1.1	Project	2	0	1	-	75	25	50	100
Total			2	0	1	-	75	25	50	100

LIST OF ELECTIVE I

- 1 Service Oriented Architecture
- 2 Embedded Systems &
- 3 Image Processing
- 4 Bio informatics
- 5 Artificial Intelligence

LIST OF ELECTIVE II

- 1 Supply Chain Management
- 2 Enterprise Resource Planning
- 3 IT Laws and Patents
- 4 Knowledge Management
- 5 E. Commerce
- 6 Customer Relationship

Programming with C

Lectures: 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:
Flow charts, Tracing flow charts, Problem solving methods, Need for computer
Languages, Sample Programs written in C 3 hrs
- 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:
while, do-while, for statements, nested loops, if else, switch, break, Continue, and
goto statements, comma operators 5 hrs
- 8 Storage types:
Automatic, external, register and static variables
- 9 Functions:
Defining and accessing, passing arguments, Function prototypes, Recursion, Library
functions, Static Functions 5 hrs
- 10 Arrays:
Defining and processing. Passing arrays to a function, Multi dimensional arrays.
- 11 Strings:
Defining and operations on strings. 6 hrs
- 12 Pointers:
Declarations, Passing pointers to a function, Operations on pointers, Pointer
Arithmetic, Pointers and arrays. Arrays of pointers function pointers. 7 hrs
- 13 Structures:
Defining and processing. Passing to a function. Unions, typedef, array of structure,
and pointer to structure. 6hrs

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
File Handling:
File operation: creation, copy, delete, update, text file, binary file

10 hrs

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, Structure 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 Mc Graw Hill
3. C- Programming E.Balagurusamy Tata Mc Graw Hill
4. How to solve it by Computer : Dromey, PHI.
5. Schaum's outline of Theory and Problems of programming with C. : Gottfried.
6. The C programming Language, Kerninghan 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). 1984

SYSTEM ANALYSIS & DESIGN .

⑥

Lectures: 4 Hrs/week
One paper: 100 marks / 3 Hrs duration

Tutorial :- 1 Hr / week
Term Work : 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
 - Waterfall approach
 - Iterative approach
 - Extreme programming
 - Rad model
 - Unified process
 - 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
 - Review existing reports, forms and procedure descriptions
 - Conduct interviews
 - Observe & document business processes
 - Build prototypes
 - Questionnaires
 - Conduct jad sessions
- Validate the requirements
 - Structured walkthroughs

Feasibility analysis

4 hrs

- Feasibility study and cost estimates
- Cost benefit analysis
- Identification of list of deliverables

Modeling system requirements

7 hrs

- Data flow diagrams logical and physical
- Structured english
- Decision tables
- Decision trees
- Entity relationship diagram



Design

- Design phase activities
- Develop system flowchart
- Structure chart
 - Transaction analysis
 - Transform analysis

7 hrs

Software design and documentation tools

- Hipo chart
- Warnier orr diagram

Designing databases

- Entities
- Relationships
- Attributes
- Normalization

Designing input, output & user interface

- Input design
- Output design
- User interface design

4 hrs

Testing

- Strategic approach to software testing
- Test strategies for conventional software
- Test strategies for object-oriented software
- Validation testing
- System testing
- Debugging

6 hrs

Implementation & maintenance

- Activities of the implementation & support phase

2 hrs

Documentation

Use of case tools,

3 hrs

Documentation-importance, types of documentation

References:

- "Analysis and Design of Information Systems: :Senn, TMH
- "System Analysis and Design" : Howryskiewycz, PHI
- "System Analysis and Design" : Awad
- "Software Engineering A Practitioners Approach": Roger S. Pressman TMH
- "System Analysis and Design Methods" : Whitten, Bentley
- "Analysis and Design of Information Systems": Rajaraman, PHI

Lectures: 4 Hrs/week
One paper: 100 marks / 3 Hrs duration

Tutorial :- 1 Hr / week
Term Work : 25 marks

1 DIGITAL LOGIC

Boolean Algebra

Gates

Combinational Circuits

Implementation of Boolean Functions

Algebraic Simplification

Karnaugh maps

Multiplexers / Demultiplexers

Decoders / Encoders

Adders : Half, Full

Sequential Circuits

Flip- Flops: S-R, J-K, D

Registers: Parallel, Shift

Counters: Ripple,

Synchronous

6 hr.

2 THE COMPUTER SYSTEM

Computer function and Interconnection

Computer functions

Interconnection Structures

Bus Interconnection

Memory System Design

Memory hierarchy and SRAM

Advanced DRAM Organisation

Interleaved memory, Associative memory

Nonvolatile memory

RAID

Cache Memory

Cache memory Principles

Elements of Cache design

Improving Cache Performance

Input / Output

External devices

I/O modules

Programmed I/O

Interrupt-driven I/O

Direct Memory Access

I/O Channels and Processors

13 hr.

CENTRAL PROCESSING UNIT

Instruction Set: characteristics & functions

Machine Instruction characteristics

Type of Operands

Types of Operations

13 hrs

Instruction set : addressing modes & formats

Addressing
Instruction Formats
CPU structure and Function
Processor Organization
Register Organization
Instruction Cycle
Instruction Pipelining

RISC

Instruction Level Parallelism and Superscalar Processors
Superscalar versus super pipelined
Limitations
Instruction level parallelism and machine parallelism
Instruction issue policy
Register Renaming
Branch Prediction
Superscalar Execution
Superscalar Implementation

CONTROL UNIT

Control Unit Operation
Micro-operations
Control of the processor
Hardwired Implementation
Microprogrammed Control
Basic concepts

6 hrs

PARALLEL ORGANISATION

Multiprocessor organizations
Types of Parallel Processor Systems
Parallel organizations
Symmetric Multiprocessors
Organization
Clusters
Cluster Configurations
Cluster Computer Architecture

7 hrs

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 Books:

1. Digital Computer Fundamentals. Bartee C. Thomas , McGraw-Hill International Edition
2. Computer Architecture by Nicholas Carter , Schaum's outlines, McGraw-Hill
3. Advance Computer Arhitecture 2nd Edition By Parthasarthy , Thomson
4. Computer Organization by Hamacher C., Zaky S. McGraw Hill
5. Computer Organisation and Architecture: Stallings, W Prentice Hall of India, New Delhi
6. Computer Architecture, Behrooz Parhami, Oxford University Press
7. Computer Fundamentals Architecture & Organization B. Ram New Age
8. Computer Organization I.S.R.D.group Tata Mc Graw Hill

Lectures: 4 Hrs/week
One paper: 100 marks / 3 Hrs duration

Tutorial :- 1 Hr / week
Term Work : 25 marks

1 Number Systems

Decimal Number Systems
Binary Number System
Hexadecimal Number System
Octal Number System
Binary Arithmetic

5 hr.

2 Propositions and logical operations

Notation, Connections, Normal forms, Truth Tables
Equivalence and Implications,
Theory of inference for statement calculus, Predicate calculus
Rules of Logic
Mathematical Induction and Quantifiers

8 hr

3 Sets, Relations and Digraphs

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)

8 hr.

4 Recurrence relations,

Towers Of Hanoi, Iterations, Homogenous linear equations with constant
Coefficients, Particular Solution, difference table. Finite order differences, Line in a
plane in general Position

8 hrs

Groups and applications:

Monoids, semi groups
Product and quotients of algebraic structures
Isomorphism, homomorphism, automorphism
Normal subgroups, Codes and group codes

8 hrs

Classification of Languages:

Overview of Formal Languages:

Representation of regular languages and grammars. finite state machines.

8 hrs

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

Books :

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 II nd Edition Schaum's Series TM1
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., Sree Kumar New Age

Lectures: 4 Hrs/week
One paper: 100 marks / 3 Hrs duration

Tutorial :- 1 Hr / week
Term Work : 25 marks

- 1 Introduction to Managerial Economics – Nature and Scope of Managerial Economics, Economic Theory and Managerial Economics, Managerial Economist - Role and Responsibilities 4 hrs
- 2 Demand – Law of demand, elasticity of demand, supply function, elasticity of supply, market equilibrium. 4 hrs
- 3 Demand forecasting – survey methods, evaluation of forecast accuracy 4 hrs
- 4 Cost – output relationship. Economies and Diseconomies of scale. Cost control and cost reduction. Break-even analysis. 4 hrs
- 5 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
- 6 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
- 7 Nature of planning, decision-making process, management by objectives. 3 hrs
- 8 Organization structures: functional, product matrix, flat and vertical structures, authority relationships, decentralization and delegation of authority. 3 hrs
- 9 Maslow, Herzberg and MacGregor's theory of motivation. 3 hrs
- 10 McClelland's achievement motivation, Blanchard's situation leadership theory. 3 hrs
- 9 Preventive maintenance, quality control, total quality management, quality circles. 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:

13

1. Principals & Practice of Management : L.M.Prasad
2. Principals 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 of Management , Koontz 7th Edition
9. International marketing , Francis Cherunilam
10. HR & Personnel Management , Ashwathappa

INTRODUCTION TO WEB TECHNOLOGY

(14)

Lectures: 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 the Web 5 hrs
 - History and evolution
 - Web Development Cycle
 - Web publishing
 - Web contents
 - Static 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
 - Head
 - Body
 - Lists
 - Ordered List
 - Unordered List
 - Definition List
 - Nesting List
 - Block Level tags
 - Block formatting, Heading, Paragraph, Comments, Text alignment, and Font size.
 - Text Level tags
 - Bold Italic, Underlined, Strikethrough, Superscript, Subscript
 - 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
 - Font Metrics
 - Units
 - Properties
 - Classes and Pseudo classes
 - CSS Tags 7 hrs

Working of ASP page

Variables

ASP forms

Date types

Operators

Object Hierarchies

ASP Object Model

Request, Response Object collections

ASP Applications

Creating Active Server Page Application

Session Object

Session Collections

Contents Collection

Response Object Method

6 JavaScript

Introduction

Operators, Assignments and Comparisons, Reserved Words

Starting with JavaScript

Writing first JavaScript program

Putting Comments

Functions

Statements in JavaScript

Working with Objects

Object Types and Object Instantiation

Date Object, Math Object, String Object, Event Object, Frame Object,

Screen Object

Handling Events

Event Handling Attributes

Window Events, Form Events

Event Object

Event Simulation

7 hrs

7 Website Design Concepts

How the Website should be

Basic rules of Web Page design

Types of Website

5 hrs

Reference Books:

1. Web Technologies Achyut S. Godbole, Atul Kahate Tata Mc Graw Hill
2. Web Tech. & Design C.Xavierv New Age
3. Multimedia and 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
 - Local page in same folder.
 - Page in different folder.
 - Page on the Web.
 - 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 a Web page including control structures using JavaScript.
10. Programs based on Event Handling.

Lectures: 4 Hrs/week
 One paper: 100 marks / 3 Hrs duration
 Term Work : 25 marks

Practical: 3 Hrs /week
 Practical exam: 50 marks

SORTING AND SEARCHING TECHNIQUES

11 hrs

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.

HASHING TECHNIQUES

4 hrs

Hash function

Address calculation techniques, Common hashing functions

Collision resolution

Linear probing, Quadratic

Double hashing

Bucket addressing

Deletion and rehashing

LINEAR LISTS

12 hrs

Stacks: LIFO structure, create, POP, PUSH, delete stack

Queues: FIFO structure Priority Queues, Circular Queues, operations on Queues

Linear List Concept

List Vs. Array, Internal pointer & External Pointer, Head, Tail of a list,

Null List, length of a list.

Linked Lists

Nodes, Linked List Data Structure

Linked List Algorithms

Create list

Insert Node (empty list, beginning, Middle, end)

Delete Node (First, general case)

Search list

Retrieve Node, add node, Remove Node, Print List

Append Linked List, array of Linked Lists

Complex Linked List structures

Header nodes

Circularly-Linked List

Doubly Linked List

Insertion, Deletion

Multilinked Lists

Insertion, Deletion

Introduction to Trees

Binary Trees

Traversals (breadth-first, depth-first)

Expression Trees

(Infix, Prefix, Postfix Traversals)

General Trees

Search Trees

Binary Search Trees

AVL Trees

10 hrs

5 Heaps

Structure

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

6 hrs

6 Multiway Trees

M-way search Trees

B-Trees

Insertion (Insert node, Search node, Split node, Insert entry)

Deletion (Node delete, Delete entry, Delete mid, ReFlow,

Balance, Combine.)

Traverse B-Tree

B-Tree Search

7 hrs

7 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

Minimum Spanning Tree

Shortest Path Algorithm

(Dijkstra's algorithm, Kruskal's algorithm, Prim's algorithm, Warshall's algorithm)

Term Work/ Practical: Each candidate will submit a journal in which at least 10 Practical 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 Mc Graw 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 Augenstein, Prentice Hall India
5. "An Introduction to Structure with application" Jean – Paul Trembly & 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

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19

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

Write a program in C to implement insertion and deletion in AVL tree

8. Write a menu driven program that implements Heap tree (Maximum and Minimum Heap tree) for the following operations. (Using Array) Insert , Delete

9. 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 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 a 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 to create a minimum spanning tree using Kruskal's algorithm.
16. Write a program to create a minimum spanning tree using Prim's algorithm.

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Operating System

Lectures: 4 Hrs/week
One paper: 100 marks / 3 Hrs duration
Term Work : 25 marks

Practical: 3 Hrs /week
Practical exam: 50 marks

System Software

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

2
h

Fundamentals of Operating System:-

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

3
hr

Process and Thread Management

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

5
hr

Concurrency Control

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

7
hrs

Memory Management

- Memory partitioning
- Swapping
- Paging
- Segmentation

7
hrs

- Virtual memory
 - Overlays
 - Demand paging
 - Performance of Demand paging
 - Virtual memory concepts
- Page replacement algorithms
- Allocation algorithms

6 I/O Systems

7
hr

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

7 File systems

5
hrs

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

8 Protection & Security

4
hrs

- Protection
 - Goals of protection
 - Domain of protection
 - Access matrix
 - Implementation of access matrix
 - Revocation of access rights
- Security
 - The security problem
 - Authentication
 - One-Time passwords
 - Program threats

- System threats
- Threat monitoring
- Encryption
- Computer security classifications

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, rmdir, 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 of shell programming, 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.

5
hrs

Term work/ Practicals:- Each candidate will submit a journal in which at least 10 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 Practicals graded for 15 marks.

Relevant Books

1. Operating Systems Achyut S. Godbole Tata Mc Graw Hill 2nd Edition
2. Operating Systems D.M.Dhardhere Tata Mc Graw Hill 2nd Edition
3. Understanding Operating system : Flynn & Mcloes 4th Edition , Thomson
4. Operating Systems Design & Implementation Andrew S. Tanenbaum, Aibert 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 Organization 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 – Sumitaba Das
11. Unix Shell Programming – Yashwant Kanetkar, BPB Publications

List of Practicals for Operating System

1. Study of Basic commands of Linux.
2. Study of Advance commands of Linux.

current directory according to the following arguments:

1. suffix to be replaced
2. replacement suffix

The script should rename each matching regular file or symbolic link in the current directory by replacing the 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 `n` and display first `n` prime numbers on standard output.

Shell scripting using general-purpose utilities.

e.g. 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.
0      Exit

```

Shell programming using filters (including `grep`, `egrep`, `fgrep`).

Write a shell script to validate the entered date. (e.g. Date format is: dd-mm-yyyy)

Write a shell script to check entered string is palindrome or not.

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 newline
- 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.

Write an `awk` program using function, which capitalizes each word in a given string.

Write a program for process creation using C. (Use of `gcc` compiler)

Use of `g++` compiler

Lectures: 4 Hrs/week
One paper: 100 marks / 3 Hrs duration

Tutorial :- 1 Hr / week
Term Work : 25 marks

Accounting process and principles, financial, cost and management accounting	4 hrs
Elements of bookkeeping, Journal, cash and bankbook, Bank reconciliation statement, Ledger, trial balance, profit and loss accounts, final accounts of Proprietary and partnership concern and Balance Sheet.	10 hrs
Cost accounting – Objectives, elements of cost, understanding of the different methods of costing.	8 hrs
Financial Management: Meaning, scope and role, a brief study of functional areas of financial management.	8 hrs
Introduction to various FM tools: Ratio Analysis	
• Meaning • Basis of comparison • Types of ratios	
Fund Flow statement and cash flow statement (without adjustments)	
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.	8 hrs
Budgeting – budgets, purpose, budgetary control, preparation of budgets, master budget, fixed and flexible budgeting.	7 hrs

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 Mc Graw Hill
5. Managerial Economics & Financial Analysis , Siddiqui S. A. Siddiqui A.S. New Age

Computer Graphics

Lectures: 4 Hrs/week

One paper: 100 marks / 3 Hrs duration

Term Work : 25 marks

Practical: 3 Hrs /week

Practical exam: 50 marks

- 1 **Introduction** 2 hrs
 - 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** 6 hrs
 - **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** 2 hrs
 - Primitive Operations
 - The display file interpreter
 - Display – File structure
 - Display control and polygons-polygon representation.
- 4 **Attributes of output primitives** 3 hrs
 - **Line attributes :-** Line type, Line width, Pen and brush options, Line color, Color and greyscale levels.
 - Color tables, greyscale, Area-fill attributes-fill styles, pattern fill, soft fill, character attributes, text attributes.
- 5 **Geometric Transformations** 6 hrs
 - 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** 8 hrs
 - 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 – Hodge man polygon clipping.

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

7 hrs

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

2 hrs

Light, Colour 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, Halftone shading, Dithering techniques.
- Colour Models – RGB Colour Model, CMY Colour Model, HSV Colour Model.
- Transparency, Shadows, Ray tracing.

5 hrs

Fractals

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

2 hrs

Computer Animation

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

2 hrs

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, J.F. Hughes & 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 Mc Graw 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

Lectures: 4 Hrs/week

One paper: 100 marks / 3 Hrs duration

Tutorial :- 1 Hr / week
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 | 6 Hrs |
| 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) | 10 Hrs |
| 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 | 6 Hrs |
| 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 | 10 Hrs |
| 5 | Unit V | Single server queue. Erlang distribution and Poisson Process. Stationary queue. Non-Erlang arrivals and modification of steady state queue concepts | 6 Hrs |
| 6 | Unit V | Single server queue. Erlang distribution and Poisson Process. Stationary queue. Non-Erlang arrivals and modification of steady state queue concepts | 7 Hrs |

Term work/ Assignments; 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 assignments graded for 15 marks.

Introduction to Probability & Statistics, Menclenhall 12th Edition, Thomson
 Introduction To Probability And Statistics J.Susan Milton, Jesse C. Arnold Tata Mc Graw

Introduction to Probability & Statistics, Menclenhall 12th Edition, Thomson
 Probability and its computer applications: Kishore Trivedi, PHI,
 Ram's Outlines Probability, Random Varibales & Random Process Tata Mc Graw Hill
 Fundamental Of Mathematical Statistics" – S.C Gupta, V.K. Kapoor

100 marks / 3 Hrs duration

Tutorial :- 1 Hr / week
Term Work : 25 marks

Communication

Concept and meaning of communication, barriers to communication, methods of communication, techniques to improve communication. 4

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) 3

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) 10

Communication in a business organization

Internal (Upward, Downward, Horizontal, Grapevine, Problems, Solutions). External Communication. Strategies for conducting successful business meeting. Documentation (notice, agenda, minutes) of meeting. Introduction to modern communication techniques (e-mail, internet, video-conferencing. etc.) Legal and ethical issues in communication (Intellectual and property rights, patents)

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.

Interpersonal skills

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

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.

6 hrs

Term Work:

Each student is to appear for at least one written test during the term.

Term work shall consist of graded answer paper of the test. Presentations, group discussion, report writing, interpersonal skills

Recommended Books :

- Business correspondence and report writing, R. C. Sharma & Krishna Mohan, Tata Mcgraw Hill.
- Business Communication for Managers , Penrose , Thomson
- Technical Communication 6th Edition , Anderson , Thomson
- Effective Technical Communication Rizvi , Tata Mcgraw Hill Publications
- 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)
- Technical Writing & Professional Communication, Huckins, Thomas, McGraw –Hill publications. Written Communication, Freeman, Sarah, Orient Longman.