

Solapur University, Solapur

M. C. A.

Syllabus (Semester – I and II)

(Choice Based Credit System)

With Effect from June 2016

**MASTER OF COMPUTER APPLICATIONS (SCIENCE FACULTY)
DETAIL SYLLABUS OF SEMESTERS I AND II**

1. Introduction: The **Master of Computer Applications (M. C. A.)** Programme has been designed with a semester approach in mind. It is a three years course and in each year there are two semesters. Courses in semester-I to semester-V are aimed at skills development in computers using various technologies. Also in each semester student has to develop a software project so that a student can become more expert in handling the programming language and the programming logic is also improved.

2. Objective: The M.C.A. program prepares students to take up positions as systems analysts, systems designers, programmers, and managers in any field related to information technology. The program, therefore, aims at imparting comprehensive knowledge with equal emphasis on theory and practice. However, the course curriculum will have enough flexibility to enable a student to undertake advance studies in Computer Science later on.

3. Intake Capacity: 60

4. Ordinances and regulations

ELIGIBILITY: Admission to the course is open to any graduate of this University or graduate of any other University recognized by UGC, New Delhi, satisfying the following conditions:

- a) The candidate should have secured at least FIFTY PERCENT marks (45% in case of candidates of reserved categories) at the aggregate of all years of Graduation Examination.
- b) The student must have taken Mathematics at XII std. or at least one of the subjects from Mathematics/ statistics/ Computer Science/Computer Applications/ Computer Programming in first year of Bachelor's Degree.
- c) The candidate should not be employed at the time of admission and should not take employment during the tenure of course.
- d) The candidate should not be above TWENTY-EIGHT years of age as on 30th June of the year of his admission.
- e) Subject to the above conditions, the final admission is based solely on the merit at the entrance test. Every candidate has to appear for the entrance test conducted during the year in which he/she is seeking admission.
- f) Seats are allocated as per the reservation policy of the State Government. However, 10% of the seats are reserved for the candidates from the other University. The entrance test score of the student admitted from other University should not be less than that of the last candidate admitted from Solapur University, Solapur.

FEES STRUCTURE: The tuition fees or laboratory fees and other fees have to be paid at the beginning of every semester. At present a student has to pay tuition fees Rs.7000/- per semester, laboratory fee

Rs.14000/- per semester and laboratory deposit of Rs. 500/- together with other fees. These fees may be revised from time to time. The fees once paid will not be refunded.

COURSESTRUCTURE: The MCA course is a SIX semester course. The teaching for the semesters I, III and V will be during the first half of the academic year and for the semesters II and IV will be during the second half the academic year. During the sixth semester the student has to work for the project and the project will be evaluated at the end of that semester.

- a) A student has to clear all the heads of passing of first and second semesters to be eligible for the admission to the fifth semester.
- b) A candidate will be awarded a class or distinction as per the rules of other science subjects.
- c) The Regulations/ Ordinance not covered in this shall be followed from the Regulations/ Ordinance laid down for the science faculty.

5. Structure of the Syllabus:

M. C. A. Part – I Semester-I

Paper Code	Title of the Paper	hours/ week	Distribution of Marks for Examination			Credits
			Internal	University	Total	
Hard Core – Theory						
HCT 1.1	Introduction to Computers	04	30	70	100	04
HCT 1.2	Programming using C	04	30	70	100	04
HCT 1.3	Digital Circuits and Microprocessors	04	30	70	100	04
HCT 1.4	Management	04	30	70	100	04
Soft Core – Theory (Any One)						
SCT 1.1	Discrete Mathematical Structures	04	30	70	100	04
SCT 1.2	Operations Research	04				
Hard Core – Practical						
HCP 1.1	Practical based on HCT 1.1	04	15	35	50	02
HCP 1.2	Practical based on HCT 1.2	04	15	35	50	02
HCP 1.3	Practical based on HCT 1.3	04	15	35	50	02
HCP 1.4	Project – I	02	15	35	50	02
Total		-	210	490	700	28

M. C. A. Part – I Semester-II

Paper Code	Title of the Paper	hours/ week	Distribution of Marks for Examination			Credits
			Internal	University	Total	
Hard Core – Theory						
HCT 2.1	Object Oriented Programming using C++	04	30	70	100	04
HCT 2.2	Data Structures	04	30	70	100	04
HCT 2.3	Operating System	04	30	70	100	04
Soft Core – Theory (Any One)						
SCT 2.1	Software Engineering	04	30	70	100	04
SCT 2.2	Graph Theory	04				
Open Elective (Any One)						
OET 2.1	Office Automation	04	30	70	100	04
OET 2.2	Linux Operating System	04				
Hard Core – Practical						
HCP 2.1	Practical based on HCT 2.1	04	15	35	50	02
HCP 2.2	Practical based on HCT 2.2	04	15	35	50	02
HCP 2.3	Project –II	02	15	35	50	02
Open Elective (Any One)						
OEP 2.1	Practical Based on OET 2.1	02	15	35	50	02
OEP 2.2	Practical Based on OET 2.2	02				
Total		-	210	490	700	28

6. Passing Standard: Passing standard is same as that of other M.Sc. courses in the Solapur University. The candidate has to appear for internal evaluation of 30 marks and external evaluation (university exam) for 70 marks for each paper/practical/project. In case of theory papers internal examinations will be conducted by the school / department. The nature of internal evaluation of practical and project will be decided by the respective schools / departments. The internal evaluation is a process of continuous assessment.

A student who failed in Term End examination (theory) & passed in internal assessment of a paper (subject) shall be given FC (Failed in Term End Exam) Grade. Such student will have to appear for Term End examination only. A student who fails in Internal assessment and passed in Term End examination (Theory) shall be given FR (Failed in Internal Assessment) Grade. Such student will have to appear for Term End examination as well as internal assessment.

In case of year down candidates from the mark scheme the candidates shall appear for the same 70 marks paper of the external examination and his performance shall be scaled to 100 marks.

7. Nature of theory question paper

- a) Duration of each theory paper is 2 hours and 30 minutes.
- b) Each paper contains 7 questions each carrying 14 marks.
- c) Students have to attempt five questions.
- d) Question No.1 is compulsory and contains 14 objective type sub-questions each carrying 1 mark.
- e) Question No.2 is compulsory and contains 3 short answers / short note type sub-questions each carrying 5 or 4 marks.
- f) Students have to attempt any three questions from Question No. 3 to Question No. 7.
- g) Question No. 3 to Question No. 7 contains 2 sub-questions

MASTER OF COMPUTER APPLICATIONS
SEMESTER I

HCT 1.1: INTRODUCTION TO COMPUTERS

Unit – I

Elements of a computer processing system: History, Evolution and Classification of Computers, Hardware & software components, Hardware components like CPU, I/O devices, storage devices, VDU etc. Software components like system software, application software, Basic architecture of a computer system. [10]

Types of Computer: Mini, Super, Mainframe, Workstation, Personal, Multimedia, Super Computer. [05]

Unit – II

Number System: Decimal, Binary, Octal, Hexadecimal, 1's and 2's Complement, floating Point representation, Character Codes- ASCII, EBCDIC. [10]

Programming languages: Need of a programming language, Classification of languages like high level & low level, Machine language & assembly language, Higher level language with examples, Generations of programming languages with examples. [05]

Unit – III

System Software: Overview of all system software: Operating system, Assembler, Compiler, Linker, Loader. [05]

Operating system: Overview Different roles played by O.S., Introduction to popular O. S. like windows, Dos & Unix, Linux, DOS Commands: Internal and External commands, Unix /Linux commands: date, ls, cp, mv, pwd, mkdir, rmdir, cd, cat, rm, adduser, passwd, chmod, write, wall, mesg, talk, head, tail, ln, wc, who, vi editor. [10]

Unit – IV

Introduction to networking: Need for networking, Issues involved in networking, Different networking models like LAN, WAN, client .server, distributed etc., Internet and internet working with its usage. [05]

Office Tools: Word, Excel, PowerPoint, Word: Structure of a Document, Common Commands, Styles, Cross Reference. Excel: Concept of Spreadsheet, use of financial and statistical functions, sorting and Searching database, linking workbooks, formula between workbooks. [10]

Reference Books:

1. Fundamentals of Computers: V. Rajaraman, Prentice Hall India Pvt. Ltd.
2. Computer fundamentals: P.K. Sinha, B P B Publications.
3. Inside PC: Peter Nortron, Sams Publishing 2002.
4. Fundamentals of Information Technology: Alexis Leon, Methews Leon, Vikas Publishing.

HCT 1.2: Programming using C

Unit – I

[15]

Introduction to problem solving: Algorithms and Flowcharts, pseudo code, Steps in problem solving.

Language Fundamentals: History, Character set, C Tokens, Keywords, Identifiers, Variables, Constant, Data Types

Operators: Types of operators, Precedence and Associativity, Expression, Statement and types of statements, Structure of 'C' program.

Console based I/O and related built-in I/O function: printf(), scanf(), getch(), getchar(), putchar()

Unit – II

[15]

Control structures: Decision making structures (if, if-else, Nested if –else, Switch), Loop Control structures (while, do-while, for, Nested for loop), break, continue, goto, exit.

Functions: Basic types of function, Declaration and definition, Function call, Parameter passing, Call by value, Call by reference, Scope of variables, Storage classes, Recursion.

Arrays: Definition, declaration and initialization of one dimensional array, Accessing array elements, Displaying array elements, Sorting arrays, Arrays and function, Two-Dimensional array, memory representation of array, row major, Column major.

Unit – III

[15]

Pointers: Definition and declaration, Initialization, indirection operator, address of operator, pointer arithmetic, dynamic memory allocation, arrays and pointers, function and pointers.

Strings: Definition, declaration and initialization of strings, standard library **functions:** strlen(), strcpy(), strcat(), strcmp(), implementation without using standard library functions.

Structures: Definition and declaration, structure variables initialization, Accessing fields and structure operations, Nested structures, Union, Differentiate between Union and structure.

Unit – IV

[15]

Introduction C Preprocessor: Definition of Preprocessor, Macro substitution directives, File inclusion directives, Conditional compilation.

File handling: Definition of Files, Opening modes of files, Standard functions: fopen(), fclose(), feof(), fseek(), rewind(), fgetc(), fputc(), fprintf(), fscanf(), fread(), fwrite(), Command line arguments.

Reference Books:

1. Let us C: Yashwant Kanetkar, 12th Edn., B P B Publications.
2. Programming in ANSI C: E. Balguruswamy, Tata McGraw Hill, 2008.
3. The C prog. Language: B. W. Kernighan, D. Ritchie, 2nd Edn., PHI.
4. Understanding Pointers in C: Yashwant Kanetkar, 4th Edn., B P B Publications.
5. How to solve it by Computer: R. G. Dromy, Pearson Education India, 2008.

HCT 1.3: Digital Circuits and Microprocessors

Unit – I

Digital Logic and Combinational Circuits: Logic gates: basic gates, derived gates and universal gates, Boolean algebra and Map simplification (K-map), Combinational Circuits: Half adder, Full adder, Subtractor, Flip-Flops: SR, D, JK, T, edge triggered Flip-flops. [15]

Unit – II

Digital Components: Integrated Circuits, Decoders, Multiplexers, Register and Shift Registers, Counters. [15]

Unit – III

The 8085 Microprocessor: Architecture of 8085, Instruction set of 8085, Addressing modes of 8085, simple programs, Buffered bus system of 8085, Timing diagrams. [15]

Unit – IV

The 8086 Microprocessor: EU and BIU of 8086 (Architecture), Instruction set of 8086, Addressing modes of 8086, Flags in 8086, concept of memory segmentation, Buffered system bus of 8086 in Minimum and Maximum mode. [15]

Reference Books:

1. Computer System Architecture: M. M. Mano, Prentice Hall India.
2. Introduction to 8085/ 8080 Microprocessors: Architecture, Programming and Applications: Ramesh Gaonkar, New Age Publishers.
3. Microcomputer systems: The 8086/8088 Family - Architecture, Programming and Design: Y. Liu, G. A. Gibson, Prentice Hall India.
4. Microprocessor and its Applications: S. Malarvizhi, Anuradha Publications.

HCT 1.4: Management

Unit – I

HRD: Selection, Appraisal, Training and Information Systems, Soft skills (communication, SWOT Analysis), Quality Circle. [09]

Marketing: Marketing Information System (MIS), Marketing Intermediaries, Advertising, Supply Chain Management. [06]

Unit – II

Finance: Basic Accounting concepts and conventions, understanding principles of Double Entry Book keeping, subsidiary Books, Preparation of Final Accounts, Use of Basic Ratios (Current Ratio, Liquid Ratio, Net Profit Ratio, Gross Profit Ratio, Debt Equity Ratio, Net Working Capital), Banking Transactions (Types of Accounts, Cheques, KYC Norms) [15]

Unit – III

Costing: Basic cost concepts, cost classification, Cost centers, Cost Units, Valuation of Inventory (FIFO, LIFO, Weighted Average), EOQ Model. [07]

Budget and Budgetary Control: Meaning of Budget, Types of Budget, Budget Manual, Budget Committee and Steps in Budgetary Control, Advantages and Limitations of Budgetary Control. [08]

Unit – IV

Management Control System: Basic Concepts of Management Control System, Areas of Control, Boundaries of Management Control, Strategic Planning and task Control, Goals and Goal Congruence, Informal and Formal Factors Influencing Control System, Functions of Controller, Key Success Variables (Input Variables, Production Variables, Marketing, Asset Management, Environment Variables etc.) Performance Measures (Finance and Non Financial) [15]

Reference Books

1. HRD: Uday Pareek, I. V. S. Raw.
2. Personnel Management: Edwin B Flippo, McGraw Hill.
3. Marketing Management: Mrs. M. M. Kamathekar, TDM Cannon.
4. Financial Accounting: Chaudhary.
5. Management Accounting: M. G. Patkar, S. K. R. Paul.
6. Costing/ Cost Accounting: B. K. Bhar, Jawahar Lal.
7. Management Control System: Pradip Kumar Sinha (Nirali Prakashan)

SCT 1.1: Discrete Mathematical Structures

Unit – I

Combinatorics: Permutations and combinations, Distinct and non-distinct objects, Generating functions for combinations, Enumerators for permutations, Distribution of distinct objects. [07]

Matrices: Basic concepts, Types of matrices, Arithmetic operations on matrices, Scalar Multiplication, Transpose of matrix, Symmetric matrix, Inverse of matrix, Solving simultaneous equation using matrices, Boolean matrices, Eigen values, Eigen vectors, Determinant. [08]

Unit – II

Mathematical Logic: Notations, Connectives, Normal forms, Theory of inference for statement calculus, Propositional logic, Predicate calculus, Inference theory of the predicate calculus. [15]

Unit – III

Relations and Functions: Elementary set theory, product sets, Relations, Closure properties and related algorithm, Functions, Types of functions, Computer representation of sets, Relations, functions and their manipulations, ordering functions, Recursion. [15]

Unit – IV

Graph Theory: Definition, walks, paths, trails, connected graphs, Di-graph representation of relations, regular and bipartite graphs, cycles and circuits, eccentricity of a vertex, radius and diameter of a graph, Central graphs, Hamiltonian and Eulerian graphs, and planar graphs. [08]

Algebraic structures: Groups, Lattices, Applications of the Residue Arithmetic's to computers, Group Codes, Definition & examples of algebraic structures their applications to computer science. [07]

Reference Books:

1. Applied Discrete Structure for Computer Science: Kenneth Levasseur, Alan Doerr, Galgotia Publications, 1986.
2. Discrete Mathematical Structures for Computer Science: B. Kolman and R. C. Busby, Prentice Hall, 1987.
3. Foundations of Discrete Mathematics: K. D. Joshi, Wiley Eastern.
4. Elements of Discrete Mathematics: C. L. Liu, D. P. Mahapatra, Tata McGraw Hill, 1977.
5. Concepts in Discrete Mathematics: S. K. Sahni, Camelot Publishing Co., USA.
6. Discrete Mathematics: Schaums series, McGraw Hill.
7. Discrete Mathematical Structures with applications to the Computer Science: Tremblay and Manohar, Tata McGraw Hill, 1977.

SCT 1.2: Operations Research

Unit - I

Introduction of Linear Programming: Various definitions, statements of basic theorems and properties, Advantages, Limitations and Application areas of Linear Programming. [05]

Linear Programming Problems: The Graphical method – Graphical Solution methods of Linear Programming problem, Phase II of the Simplex Method, Primal and Dual Simplex Method, Big –M method, Transportation Problem and its solution, Assignment Problem and its solutions by Hungarian Method.

[10]

Unit – II

Non-Linear programming: Kuhn-Tucker conditions, Convex functions and convex regions, Convex programming problems, Algorithms for solving convex programming problems. [15]

Unit – III

PERT and CPM: Basic differences between PERT and CPM, Arrow Networks, time estimates, Earliest expected time, Latest – allowable occurrences time, Forward Pass Computation, Backward Pass Computation, Representation in Tabular Form, Critical Path, Probability of meeting scheduled date of completion, Calculation on CPM network. Various floats for activities, Critical path updating projects. Operation time cost trade off Curve project, Time cost – trade off Curve, Selection of schedule based on Cost. [15]

Unit – IV

Network Flow Problem: Formulation, Max-Flow Min-Cut theorem, Ford and Fulkerson's algorithm. Exponential behavior of Ford and Fulkerson's algorithm.

[10]

Matroids: Definition, Graphic and Cographic matroids, Matroid intersection problem. [05]

Reference Books:

1. Linear Programming: G. Hadley, Addison Wesley, 1969.
2. Operations Research an Introduction: H. A. Taha, Macmillan N. Y., 1971.
3. Operations Research: Kanti Swaroop, Gupta and Manmohan, Sultan Chand and Co., 1985.
4. Operations Research Theory and Applications: J. K. Sharma, 2nd Ed. Macmillan India ltd, 2003.
5. Mathematical Models Operations Research: J. K. Sharma, McGraw Hill, 1986.

SEMESTER II

HCT 2.1: Object Oriented Programming Using C++

Unit – I

Overview Of C++: Object Oriented Programming, Introducing C++ Classes, Concepts of Object Oriented Programming, C++ as a superset of C, New style comments, main function in C++, meaning of empty argument list, function prototyping, default arguments and argument matching, User defined data types: enumerated types, use of tag names, anonymous unions, scope of tag names. [08]

Classes & Objects: Classes, Structure & Classes, Union & Classes, Inline Function, Scope Resolution operator, Static Class Members: Static Data Member, Static Member Function, Passing Objects to Function, Returning Objects, Object Assignment. Friend Function, Friend Classes. [07]

Unit – II

Array, Pointers References & The Dynamic Allocation Operators: Array of Objects, Pointers to Object, Type Checking C++ Pointers, The This Pointer, Pointer to Derived Types, Pointer to Class Members, References: Reference Parameter, call by reference and return by reference Passing References to Objects, Returning Reference, Independent Reference, C++'S Dynamic Allocation Operators, Initializing Allocated Memory, Allocating Array, Allocating Objects. [08]

Constructor & Destructor: Introduction, Constructor, access specifiers for constructors, and instantiation, Parameterized Constructor, Multiple Constructor in A Class, Constructor with Default Argument, Copy Constructor, Destructor. [07]

Unit – III

Overloading as polymorphism: Function & Operator Overloading: Function Overloading, Overloading Constructor Function Finding the Address of an Overloaded Function, Operator Overloading: Creating A Member Operator Function, Creating Prefix & Postfix Forms of the Increment & Decrement Operation, Overloading The Shorthand Operation (I.E. +=, -= Etc), Operator Overloading Restrictions, Operator Overloading Using Friend Function, Overloading New & Delete, Overloading Some Special Operators, Overloading [], (), -, Comma Operator, Overloading << And . [08]

Inheritance: Base Class Access Control, Inheritance & Protected Members, Protected Base Class Inheritance, Inheriting Multiple Base Classes, Constructors, Destructors & Inheritance, When Constructor & Destructor Function are Executed, Passing Parameters to Base Class Constructors, Granting Access, Virtual Base Classes. [07]

Unit – IV

Virtual Functions & Polymorphism: Virtual Function, Pure Virtual Functions, Early Vs. Late Binding. [03]

Exception handling in C++: try, throw, catch sequence, multiple catch blocks, uncaught exceptions, catch-all exception handler [03]

Templates: Reason for templates compactness and flexibility, function template examples explicit specialization, class templates, out of class definition of member functions. [04]

The C++ I/O System Basics: C++ Streams, The Basic Stream Classes C++
Predefined Streams, Formatted I/O: Formatting Using The Ios Members, Setting The Format Flags, Clearing Format Flags, An Overloaded Form Of Setf(), Using Width() Precision() and Fill(), Using Manipulators to Format I/O, Creating Your own Manipulators. [05]

Reference Books:

1. C++: The Complete Reference: Herbert Schildt, Tata McGraw Hill.
2. Object Oriented Programming with C++: E. Balguruswami, Tata McGraw Hill.
3. Programming with C++ made simple: M. Kumar, Tata McGraw Hill.

HCT 2.2: Data Structures

Unit – I

Fundamental notions: Primitives and composite data types, choice of data structure and complexity of algorithms. [04]

Arrays: Single and Multidimensional Arrays, sparse matrices. [04]

Stacks: Processing the stacks, Linked list implementation, Application of Stacks for expression solving, Non recursive implementation of recursive algorithms. [07]

Unit – II

Queues: Processing the queues, Linked list implementation, Dequeues, Priority queues and their applications. [06]

Linked List: Processing linked list, Circularly linked list, Doubly linked list, Multilinked lists, String and characters manipulation using arrays and linked list. [09]

Unit – III

Trees: Representation of hierarchical relationships, Tree processing, Binary trees, linked list implementation, traversal algorithms, Graph theoretic solutions and tree traversals, Binary trees, Threaded binary trees, Height balanced trees, General Trees. [08]

Design and analysis of algorithm for the implementation: Greedy methods, Dynamic programming, Backtracking, Branch and bound. [07]

Unit – IV

Sorting and searching: Various sorts viz. Insertion, Bubble sort, Selection sort, Quick sort, Merge sort, Radix / Bucket sort, Counting sort, searching algorithms and their complexities, Binary tree indexing, B-tree indexing, Hash indexing. [15]

Reference Books:

1. Data structures and algorithms: Alfred Aho, John Hopcraft and Jeffrey Ullman, Addison – Wesley.
2. Introduction to data structures: Bhagat Singh and Thomas Nap, West Publishing Company.
3. The C Programming Language: Brian W. Kernighan, Dennis M. Ritchie, Prentice Hall, 1988.
4. Introduction to Data Structures with applications: J. P. Tremble, Tata McGraw Hill, 1984.
5. Data and file structures: Weiderberg.

HCT 2.3: Operating System

UNIT-I

Introduction and structure of Operating System: Concept of multi – programming, Parallel, Distributed and real – time – sharing, Operating system structure - Operating system components and Services System Call System.

[15]

UNIT-II

Process Management, Synchronization and Deadlocks: Process Concept, process scheduling, cooperating process, Threads, inter process communication, CPU scheduling Criteria, scheduling algorithms-FCFS, SJF, Priority, Round Robin, Multilevel feedback queue scheduling.

Process Synchronization and Deadlocks: Critical Section problem, Synchronization hardware, Semaphores, Critical region, Monitors, Deadlock system model, characterization of deadlocks and deadlock Prevention, Avoidance and detection, recovery from deadlock.

[15]

UNIT-III

Memory Management: Memory Management, Logical and physical Address Space, Swapping, Contiguous Allocation, Paging, Segmentation.

Virtual, memory: demand paging and its performance, page replacement algorithm, allocation of frames, thrashing.

[15]

UNIT-IV

File System: Secondary Storage Structure File Concept Access method, Directory Structure, Protection and consistency Semantics, File System Structure, Allocation Method, Free space Management, Directory implementation, Disk Structure, Disk Scheduling methods, Disk Management, Swap space Management.

Security and protection: goals of protection domain of protection, access matrix, security program threats, system threats.

CASE Study: Network Operating System, OS Environment, Comparison of Distributed Operating System, Multiprocessor Time Sharing Systems and Network Operating System.

[15]

Reference Books:

1. Operating System Principles: Abraham Silberschatz, Peter Galvin, Greg Gagne, 7th ed., Wiley Student Edition.
2. Operating System: Bawn.
3. Modern Operating Systems: Andrew S. Tanenbaum, Prentice Hall India.
4. Operating Systems: Stuart E. Madnick, John J. Donovan, McGraw-Hill, 1974.
5. Operating system: Peterson.

SCT 2.1: Software Engineering

Unit – I

Introduction: Product and Process: Evolving role of software, software characteristic and components, crisis, myths, software engineering – a layered technology, software process, linear sequential model, prototyping model, RAD model, evolutionary software process model. [10]

Software Process And Project Metrics: Measures, metric indicators, metric in process and the project domains, software measurement, metrics for software quality, software quality assurance. [05]

Unit – II

Analysis Concepts And Principles: Requirement analysis, communication techniques, analysis principles, software prototyping & Specification. [07]

Analysis Modeling: Elements of the analysis model, data modeling, functional modeling, behavioral modeling, the mechanics of structured analysis, data dictionary, other classical analysis methods. [08]

Unit – III

Design Concepts & Principles: Software Design and software Engineering design process, Design principles, Design concepts, Design methods-Data design, Architectural design and process, Transform and Transaction mappings, Design post processing, Architectural design optimization, Interface design, Procedural design. [15]

Unit – IV

Software Testing Methods: Fundamentals, Test case design, White box testing, basis path testing, control structure testing, black box testing, Software testing strategies. [08]

Object Oriented Software Engineering: Object oriented concepts, Identifying the elements of an object model, Management of object-oriented software projects, Object-oriented analysis, design and testing. [07]

Reference Books:

1. Software Engineering: Roger S. Pressman, McGraw Hill, 1997.
2. Software Engineering: Shooman, McGraw Hill, 1987.
3. Software Engineering: Ian Sommerville, Addison Wesley, 1985.
4. Object Oriented Analysis and Design: Grady Booch, Pearson.
5. Object Oriented Modeling and Design: James Rumbaugh, Michael Bluha, Prentice Hall India, 1991.
6. Fundamentals of Software Engineering: Carlo Ghezzi, Mehdi Jazayeri, Dino Mandrioli, Prentice Hall India, 2003.

SCT 2.2: Graph Theory

Unit – I

Introducing graphs and algorithmic complexity: Introducing graphs, Introducing algorithmic complexity, Introducing data structures and Depth-first searching, Two linear –time algorithms.

Spanning – trees, branchings and connectivity:

Spanning-trees and branchings, Optimum weight spanning-trees, Optimum branchings, enumeration of spanning-trees, Circuits, cut-sets and connectivity, Fundamental circuits of a graph, Fundamental cut-sets of a graph, Connectivity. [15]

Unit – II

Planner graphs: Basic properties of planner graphs, Genus, crossing-number and thickness, Characterisations of planarity, Dual graphs, A planarity testing algorithm.

Networks and flows: Networks and flows, Maximising the flow in a network, Menger’s theorem and connectivity, A minimum-cost flow algorithm, Summary and references, Exercises. [15]

Unit – III

Matchings: Definitions, Maximum-cardinality matchings, Perfect matchings, Maximum-weight matchings, Summary and references, Exercises.

Eulerian and Hamiltonian tours: Eulerian paths and circuits, eulerian graphs, Finding Eulerian circuits, Postman problems, counting Eulerian circuits, The Chinese postman problem for undirected graphs, The Chinese postman problem for digraphs, Hamiltonian tours, Some elementary existence theorems, Finding all Hamiltonian tours by metrical products, The traveling salesman problem, 2-factors of a graph. [18]

Unit – IV

Colouring graphs: Dominating sets, independence and cliques, Colouring graphs, Edge-colouring, Vertex-colouring, Chromatic polynomials, Face-colouring of embedded graphs, The five-colour theorem, The four-colour theorem, Summary and references, Exercises. [12]

Reference Books:

1. Algorithmic graph theory: Alan Gibbons, Cambridge University Press.
2. Graph theory: Harary, Addison Wesley, 1972.

OET 2.1: Office Automation

UNIT – I

[15]

Introduction to Computer: Applications of Computer – Advantages of Computer – Terms related to Computer - Characteristics of Computer: Speed, Storage, Versatility and Diligence – Hardware & Software.

Windows: Desktop icons and their functions: My computer, My documents, Network neighborhood, Recycle Bin, Quick launch tool bar, System tray, Start menu, Task bar, Dialog Boxes: List Box, Spin Control Box, Slide, Drop-down list, Radio button, Check box, Text box, Task Bar - System Tray - Quick launch tool bar - Start button - Parts of Windows -Title bar-Menu bar - Scroll bar-Status bar, Maximize, Minimize, close and Resize & Moving a Window, Keyboard Accelerators: Key board short keys or hotkeys.

UNIT – II

[15]

MS Word: Working with Documents -Opening & Saving files, Editing text documents, Inserting, Deleting, Cut, Copy, Paste, Undo, Redo, Find, Search, Replace, Formatting page & setting Margins, Converting files to different formats, Importing & Exporting documents, Sending files to others, Using Tool bars, Ruler, Using Icons, using help.

Formatting Documents: Setting Font styles, Font selection- style, size, colour etc, Type face - Bold, Italic, Underline, Case settings, Highlighting, Special symbols, Setting Paragraph style, Alignments, Indents, Line Space, Margins, Bullets & Numbering.

Setting Page style: Formatting Page, Page tab, Margins, Layout settings, Paper tray, Border & Shading, Columns, Header & footer, Setting Footnotes & end notes – Shortcut Keys; Inserting manual page break, Column break and line break, Creating sections & frames, Anchoring & Wrapping, Setting Document styles, Table of Contents, Index, Page Numbering, date & Time, Author etc., Creating Master Documents, Web page.

Creating Tables: Table settings, Borders, Alignments, Insertion, deletion, Merging, Splitting, Sorting, and Formula.

Drawing: - Inserting Clip Arts, Pictures/Files etc.

Tools: Word Completion, Spell Checks, Mail merge, Templates, Creating contents for books, Creating Letter/Faxes, Creating Web pages, Using Wizards, Tracking Changes, Security, Digital Signature. Printing Documents – Shortcut keys.

UNIT – III

[15]

MS Excel: Spread Sheet & its Applications, Opening Spreadsheet, Menus - main menu, Formula Editing, Formatting, Toolbars, Using Icons, Using help, Shortcuts, Spreadsheet types. Working with Spreadsheets- opening, Saving files, setting Margins, Converting files to different formats (importing, exporting, sending files to others), Spread sheet addressing - Rows, Columns & Cells, Referring Cells & Selecting Cells – Shortcut Keys.

Entering & Deleting Data: Entering data, Cut, Copy, Paste, Undo, Redo, Filling Continuous rows, columns, Highlighting values, Find, Search & replace, Inserting Data, Insert Cells, Column, rows & sheets, Symbols, Data from external files, Frames, Clipart, Pictures, Files etc, Inserting Functions, Manual breaks.

Setting Formula: finding total in a column or row, Mathematical operations (Addition, Subtraction, Multiplication, Division, Exponentiation), using other Formulae.

Formatting Spreadsheets: Labelling columns & rows, Formatting- Cell, row, column & Sheet, Category - Alignment, Font, Border & Shading, Hiding/Locking Cells, Anchoring objects, Formatting layout for Graphics, Clipart etc., Worksheet Row & Column Headers, Sheet Name, Row height & Column width, Visibility - Row, Column, Sheet, Security, Sheet Formatting & style, Sheet background, Colour etc, Borders & Shading – Shortcut keys.

Working with sheets: Sorting, Filtering, Validation, Consolidation, and Subtotal.

Creating Charts: Drawing. Printing. Using Tools – Error checking, Formula Auditing, Creating & Using Templates, Pivot Tables, Tracking Changes, Security, Customization.

UNIT-IV

[15]

MS Power point: Presentation – Opening new presentation, Different presentation templates, setting backgrounds, selecting presentation layouts.

Creating a presentation: Setting Presentation style, Adding text to the Presentation.

Formatting a Presentation: Adding style, Colour, gradient fills, Arranging objects, Adding Header & Footer, Slide Background, Slide layout. Adding Graphics to the Presentation- Inserting pictures, movies, tables etc into presentation, Drawing Pictures using draw.

Adding Effects to the Presentation: Setting Animation & transition effect. Printing Handouts, Generating Standalone Presentation viewer.

MS Access: Introduction, Planning a Database, Starting Access, Access Screen, Creating a New Database, Creating Tables, Working with Forms, Creating queries, Finding Information in Databases, Creating Reports, Types of Reports, Printing & Print Preview – Importing data from other databases viz. MS Excel etc.

Reference Books:

1. Information Technology in Business: Principles, Practices, and Opportunities by James A Senn, Prentice Hall.
2. Technology and Procedures for Administrative Professionals by Patsy Fulton-Calkins, Thomson Learning.
3. Computer Fundamental MS Office – Including Internet & Web Technology: Anupama Jain (Author), Avneet Mehra

4. The Complete Reference: Virginia Andersen, McGraw Hill
5. MS Office 2007 in a Nutshell: S. Saxena, Vikas Publications
6. MS-Office 2007 Training Guide: S. Jain, BPB Publications
7. Learning Computer Fundamentals, MS Office and Internet & Web Technology: D. Maidasani.

OET 2.2: Linux Operating System

Unit – I

Introduction to RED Hat Linux: Advantages of Linux, Other Linux distributions, Red Hat Linux Installation, Concept of Linux loader, Hardware Requirements.

Working with Linux: Linux file system, Shells, Text editors, Changing User Information, File Permissions, Virtual Consoles. [15]

Unit – II

The X Window System: Basic X window system, Configuring X window systems, Starting X, Selecting & using X window.

Managing Services: Linux Boot Process, System services and run levels, Controlling services at boot with administrative tools, Starting and stopping services manually. [15]

Unit – III

Managing Software & System Resources: Using RPM for software management, Using RPM on the command line, Extracting a single file from & RPM file, Graphical Package Management, System monitoring tools.

Printing with Linux: Configuring & managing print services, Local printer installation, Network printer installation, Linux printing commands, Using the Common UNIX Printing System (CUPS), Console print control. [15]

Unit – IV

Network Connectivity: Networking with TCP/IP, Hardware devices for networking, Using RED HAT Linux network configuration tools, Using DHCP [Dynamic Host, Configuration Protocol, Using the network file system, Wireless networking.

Introduction to DNS & Samba: Introduction to DNS, Essential DNS concepts, Configuring namespaces with DNS, Installing Samba, Configuring Samba, Running the Samba Server. [15]

Reference Books:

1. Red Hat Linux 6 Unleashed: David Pitts, Bill Ball, Sams, 1999
2. Red Hat Fedora 4 Unleashed: Paul Hudson, Andrew Hudson, Bill Ball, Hoyt Duff, Sams, 2000.

Chairman
Ad hoc BOS in Computer Science