

MCA 101 - Mathematical Foundations of Computer Science

Module 1:- Sets: Basic Concepts

Relations: Binary relations, Equivalence relations and partition.

Functions: Different types of functions, Composition and Inverse, Recursive and hashing functions. Mathematical Induction.

Module 2:- Partial Ordering Relations

Partially ordered set: Representation of Poset - Hasse Diagram, LUB, GLB, well ordered set, meet and join of elements.

Lattices as partially ordered sets: Definition and basic properties, Lattices as algebraic systems, sub lattices.

Basic Concepts of Automata Theory: Alphabets, Strings, Languages, DFA, NFA and their representations.

Module 3:- Logic

Mathematical logic, Logical operators – Conjunction, Disjunction, Negation, Conditional and biconditional. Truth tables. Equivalence formula, Tautology, methods of proof-direct, indirect, contradiction, equivalence and induction. Inference Theory, Validity by truth table, Rules of Inference. .

_Predicate calculus : Predicates , statement functions, variables and quantifiers, predicate formulas, free and bound variables, the universe of discourse.

Module 4:- Graph Theory

Basic terminology: Different types of graphs – Directed and undirected, Simple, Pseudo, Complete, Regular, Bipartite. Incidence and degree, Pendant and Isolated vertex and Null graph. Isomorphism, Sub graphs, Walk, Path and Circuit, Connected and disconnected graphs and components, operations on graphs. Euler Graphs, Fleury's Algorithm, Hamiltonian circuits and paths. Traveling salesman problem. Matrix representation of graphs – Incidence and Adjacency matrices.

Module 5:- Trees & Planar Graph

Trees: Basic properties, Rooted and binary trees, Binary search trees, Tree traversals – Pre order, In order and Post order , Spanning Trees, Prims and Kruskals algorithm.

Planar graphs: Kuratowski's two graphs and Euler's formula . Detection of planarity.

References

- Discrete Mathematical Structures with Applications to Computer Science by J. P. Tremblay and R Manohar, Tata McGraw-Hill Publications, 1997.
- Graph Theory by Narsingh Deo, Prentice-Hall of India publications, 2004.
- Theory of computer science (Automata, Languages and Computation), 2nd ed. Mishra K.L.P , N Chandrasekharan, Prentice-Hall of India publications.
- Discrete Mathematical Structures, Theory and Applications . D.S. Malik, Thomson Learning , I Edn.
- Discrete Mathematics for Computer Science, Haggard, Thomson Learning , I Edn.
- Discrete Mathematics and Its Applications by Kenneth H Rosen. Tata McGraw-Hill Publications.
- Introduction to Automata Theory, Languages and Computation by Hopcroft and J. D .Ullman. Narosa Publications.
- Mathematical foundation of Computer Science by Y. N Sings. New Age international Publishers.
- Bernard Kolman, Robert.C.Busby & Sharon Ross, "Discrete Mathematical structures" Prentice Hall of India,2001.

MCA 102 DIGITAL SYSTEMS & LOGIC DESIGN

Module 1 - Number systems and code.

Number systems - Efficiency of number system, Decimal, Binary, Octal, Hexadecimal-conversion from one to another- Binary addition, subtraction, multiplication and division, representation of signed numbers, addition and subtraction using 2's complement and 1's complement.

Binary codes - BCD code, Excess 3 code, Gray code, Alphanumeric code, Error detection codes, Error correcting code.

Module II - Logic Gates and Boolean Algebra.

Logic Gates - Basic logic gates- AND, OR, NOT, NAND, NOR, Exclusive OR, Exclusive NOR gates- Logic symbols, truth table and timing diagrams.

Boolean Algebra - Basic laws and theorems , Boolean functions, truth table, minimization of boolean function using K map method, Realization using logic gates and universal gates.

Module III - Combinational and Sequential Logic Circuits.

Combinational circuits - Half adder, Full Adder, Parallel binary adder, Subtractor, Magnitude Comparator, Decoders, Encoders, Multiplexers, Demultiplexers, Parity bit generator, PLA.

Sequential circuits - Flip Flops – RS, JK, T and D Flip Flops, Edge triggered Flip Flops, Master slave Flip Flops.

Module IV - Registers and counters.

Registers - Serial in serial out, Serial in Parallel out, Parallel in serial out, Parallel in Parallel out registers, Bidirectional shift registers, universal shift registers.

Counters - Synchronous and asynchronous counters, UP/DOWN counters, Modulo-N Counters, Cascaded counter, Programmable counter, Counters using shift registers, application of counters.

Module V - Introduction to computers.

Basic components of a computer , I/O devices - Input and output devices, printers, Display devices, Scanners. Mother Board - components of mother board. Secondary storage devices - Hard disk- components of hard disk, data storage in hard disk, disk geometry.CD Family, DVD.

References

- Digital logic and Computer design - Morris Mano, Prentice Hall of India,2004.
- Digital Fundamentals - Floyd, Pearson Education, 2004.
- All about Hard Disk- Manohar Lotia, BPB Publications.
- Digital principles and Applications- Albert Paul Malvino, Donald P Leach, McGraw Hill.
- All about Mother Board- Manohar Lotia, 2002.
- Digital computer Fundamentals - Thomas C Bartee, McGraw Hill.
- The Complete Reference PC Hardware – Craig Zacker, John Rourke, Tata McGraw-Hill, 2004.

MCA 103 Computer Organization & Architecture

Module I

Introduction: Basic structure of computers-Machine Instructions and programs: Memory Locations and addresses, Memory Operations, Instructions and Instruction sequencing, Addressing modes, Basic Input Output Operations, Subroutines.

Module II

Central Processing Unit : Arithmetic & Logic Unit: Number Representation – Addition of positive numbers – Fast Adders – Signed Addition and Subtraction – Multiplication of positive numbers – Multiplication using Booth's algorithm - Fast Multiplication – Floating point numbers and Operations. The Processing Unit : Basic Concepts - Instruction execution cycle - sequencing of control signals - hardwired control - microprogrammed control - control signals - microinstructions- microprogram sequencing - Branch address modification- Pre fetching of microinstructions

Module III

The Main Memory: Memory Hierarchy – Main memory - RAM-ROM – Cache Memory – Performance Considerations -Virtual Memory- Memory Management Requirements, Secondary storage – memory interleaving.

Module IV

Input / Output Organization: Accessing I/O devices - Interrupts: Interrupt processing – hardware interrupts –programmable interrupt controller – Vectored Interrupts - Interrupt nesting - Daisy chaining - Direct memory access (DMA): DMA operations & DMA Controller – Buses – Introduction to I/O interfaces.

Module V

Parallel processing : Basic Parallel Processing Architecture - Flynn's Classification - SISD, MISD, SIMD, MIMD structures - Pipelining – Basic Concepts of pipelining, Instruction Pipelining, Hazards, Vector processing & Vector processors - Loosely Coupled & Tightly Coupled Systems - Instruction-level parallelism: Concepts of instruction-level parallelism (ILP), Superscalar, Superpipelined and VLIW processor architectures - Comparison of RISC and CISC.

References

Computer Organization, V C Hamacher, Mc-Graw Hill International Edition, Fifth Edition.
~~Computer Architecture: A Quantitative Approach~~ - John Hennessy and David Patterson, Morgan Kaufmann Publishers Inc., Third Edition
Computer System Architecture – M Morris Mano –(Prentice Hall)- Third Edition.
Computer Organization and Architecture- William Stallings - Fifth Edition.
Structured Computer Education – Andrew S Tanenbaum-(Prentice Hall)-Fourth Edition.

MCA 104 Principles of Management & Accounting

Module I

Basic Managerial Concepts, Levels of management, Managerial Skills, Concept of management principles, nature and need of management, management functions, management thought – classical approach, scientific management, fayol's management, bureaucratic approach, systems approach, Contingency approach. Planning – Meaning, nature, structure, steps, effective planning, MBO, SWOT Analysis. Organizing – meaning, process, structure, formal and

informal, types of organization, departmentation, delegation of authority.

Module II

Staffing – meaning, nature, staffing process, recruitment & selection. Directing, supervision, Motivation – significance, motivational theories- Maslow's need hierarchy, McGregor's Theory X & Theory Y. Leadership, Communication – formal and informal, Oral and written, barriers, effective communication. Controlling-concepts, steps, objectives, features of a good control system.

Module III

Organizational behavior – Key elements, scope, models of OB, Individual behavior, personality, attitudes values and job satisfaction, Group behavior, team building- Types, process, roles.

Module IV

Marketing Management-importance, scope. Core Marketing Concepts, Marketing research, Customer value, Customer relationship management, Brand Equity, Product Life Cycle, Pricing Strategies, Distribution Channels, Promotions – Sales promotions, advertising and public relations. Marketing Information System, Global marketing and Integration.

Module V

Management Accounting- concepts, functions, role, Financial Accounting, Principles of accounting, accounting concepts, double entry system, journal entry, posting, trial balance, subsidiary books, final accounts. Depreciation – meaning, methods of depreciation.

References

- Principles of Management, R N Gupta, S.Chand & Company Ltd.
- Essentials of Management – Koontz & Wheinrich, 7th Edition, PHI Publications
- Global marketing management, Keegan, 7th Edition, PHI Publications
- Marketing management – Kotler, Keller, Jha and Koshy, 13th edition, Pearson Education
- Accounting for Management, Srinivasan & Murugan, S.Chand & Company Ltd
- Organisational Behavior, S.S Khanka, S.Chand & Company Ltd
- Principles of Management, L M Prasad, Sultan Chand Publications

MCA 105 Structured Programming in C

Module I

Introduction to algorithm, flowchart, structured programming concept, programs – Compiler, Interpreter.

Introduction to C Language: The C character set, identifiers and keywords, data types, how floats and doubles are stored, constants, variables and arrays, declarations, expressions, statements, Lvalues and Rvalues , type conversion, symbolic constants.

Module II

Operators and expressions: Arithmetic operators, unary operator, relational and logical operator, assignment operators, the conditional operator, type conversion, Library function

Data input and output: Single character input, single character output, scanf, printf, puts gets functions, interactive programming.

Control statement: Branching: if else statement, Looping, nested control structure, switch statement, break statement, continue statement, comma operator, goto statement.

Module III

Functions: Overview, function prototypes, passing arguments to a function, recursion.
Program structure: Storage classes, automatic variables, external variables, static variables, multifile program.

Arrays: Defining an array, passing array to functions, multidimensional arrays, strings: one dimensional character array, array of strings.

Module IV

Pointers: Fundamentals, void pointer, null pointer, passing pointers to a function, pointers and one dimensional arrays, dynamic memory allocation, operation on pointers, pointers and multidimensional arrays, array of pointers, pointer to an array, pointers and strings, structure pointer, pointers to function, pointers and variable length arguments list, passing functions to other functions.

Structures and unions: Defining a structure, processing a structure, user defined data types, structure and pointers, passing structure to function, self-referential structures, and union.

Module V

Data files: Why files, opening and closing a data file, reading and writing a data file, processing a data file, unformatted data file, concept of binary file.

Low level programming: Register variable, bitwise operations, bit fields.

Additional features of C: Enumeration, Command line parameters, Macros, C Preprocessor.

References

- The c programming language – Brian W Kernighan & Dennis Ritchie IInd edition Eastern Economy Edition, Prentice Hall 2001
- Programming with C – Byron S Gottfried– Schaum’s outlines 2nd Edition,2010
- Computer Science: A Structured Programming Approach Using C, Forouzan, 3rd Cengage Learning 2007
- C – How to Program, Deitel & Deitel, Pearson Education Asia, 6th Edition,2009
- Programming in C –Pradip Dey, Manas Ghosh – Oxford Higher Education ,2007
- Ansi C programming Bronson, Cengage learning, C2009
- Understanding pointers in C- Yashavant Kanetkar – BPB publication , 2009
- Let us C - Yashavant Kanetkar – BPB publication C. 1997
- C by discovery – I s Foster – Pearson C 2005
- Working with C - Yashavant Kanetkar – BPB publication,2008
- Instant C program – Ivor Horton – Wrox, 1995
- The art of programming computer science with ‘C’ – Steven c Lawlor – Wess , Cengage C2006

MCA 106 C Programming Lab

Section A

- Implementation of the various Data Types in C.
- Demonstration of Data type conversion (Hint: Usage of type casting).
- Implementation of various Storage Types.
- Demonstration of for loop.
- Demonstration of do...while loop.
- Demonstration of while loop.
- Demonstration of nested if (Hint: Use logical operators).
- Demonstration of switch... case structure.

- Implementation of arrays.
- Implementation of multidimensional arrays (Hint: implement matrix operation).
- Implementation of functions (Hint: Demonstrate call by value, call by schemes, passing of arrays).
- Demonstration of various string operations (Hint: Usage of user defined functions only allowed).
- Demonstration of pointer operations.
- Demonstration of recursion (Hint: GCD, factorial, Fibonacci series).
- Demonstration of Debugging a C program.

Section B

- Implementation of structures (Hint: simple structure operations, array of structures).
- Implementation of Union.
- Implementation of pointers to structures and unions.
- Demonstration of dynamic allocation of memory (Hint: malloc, calloc, realloc, free).
- Demonstration of sorting techniques (Hint: selection sort, bubble sort).
- Demonstration of searching techniques (Hint: linear search, binary search).
- Demonstration of bitwise operations.
- Demonstration of macro processing.
- Demonstration of various file operations. (Hint: Text file)
- Implementation of character counting, line counting and word counting for a file.
- Program to find the lengthiest line in a text file.

MCA 107 - PC HARDWARE LAB

1. Identification of PC Components and Assembling the PC
2. Understanding BIOS set up-
3. Installation of Operating Systems-
4. Installation of Software Packages
5. Replacing and fitting of Hard Disk and Removable Disk Drives on PC
6. Identification of different cards in the PC
7. Disc Managers and it's use
8. Virus removal and disc scan
9. Backup and Restoration utility
10. Connecting input/output devices and installation of their driver softwares.
11. Configuration of Audio and Video
12. Trouble shooting of the PC

Reference

The Complete Reference – PC Hardware – Craig Zacker & John rourke, Edition 2001 Tata McGraw Hill

MCA 108 Communication & Soft skills

Module I

Communication- Channels, Technical Communication, Importance.

Listening Process – Types, Improving Listening Process.

Module II

Speaking- Speech Process, Strategies for good communication,
Improving fluency, Body Language,
Professional Speaking – Job Interviews, Group Discussions.

Module III

Presentation Skills,
Professional Writing – resumes and job applications,
Email messages, Reports.

References

- Effective Technical Communication- M. Ashraf Rizvi, 2005 edition, Tata McGraw Hill Publications
- Technical Communication, Pfeiffer & Padmaja, 6th Edition, Pearson Education
- The Ace of Soft Skill, Ramesh, Pearson Publications.
- Technical English, Sumant, 2nd Edition, Tata McGraw Hill Publications