

I Semester

MCA101 - MATHEMATICAL FOUNDATION OF COMPUTER SCIENCE

Module 1:- Sets

Basic Concepts

Relations: Binary relations, Equivalence relations and partition.

Functions: Different types of functions, Composition and Inverse, Recursive 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, Distributive lattices and complimented lattices.

Boolean Algebra: Definitions, basic theorems and postulates.

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

Module 3:- Logic

Mathematical logic, Logical operators – Conjunction, Disjunction, Negation, Conditional and biconditional. Truth tables. Equivalence formula, Tautology, Inference Theory, Validity by truth table, Rules of Inference. Predicate Calculus.

Module 4:- Graph Theory

Basic terminology. Different types of graphs – Directed and undirected, Simple, Multi, 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. 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, Path length, Spanning Trees, Prims and Kurskals algorithm.

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

Text Book

1. Discrete Mathematical Structures with Applications to Computer Science by J. P. Tremblay and R Manohar. Tata McGraw-Hill Publications.
2. Graph Theory by Narsingh Deo. Prentice-Hall of India publications.

References

1. Discrete Mathematical Structures, Theory and Applications . D.S. Malik, Thomson Learning , I Edn.
2. Discrete Mathematics for Computer Science, Haggard, Thomson Learning , I Edn.
3. Discrete Mathematics and Its Applications by Kenneth H Rosen. Tata McGraw-Hill Publications.
4. Introduction to Automata Theory, Languages and Computation by Hopcroft and J. D .Ullman. Narosa Publications.
5. Mathematical foundation of Computer Science by Y. N Sings. New Age international Publishers.

MCA 102 - PROBABILITY AND STATISTICS

Module 1:- Probability Theory

Sample space, Events, Axiomatic approach to probability, Addition and multiplication theorem on probability, Independent events, Conditional probability, Bayes Theorem

Module 2:- Random variables and Distribution

Random variables, Probability density functions and distribution functions, Marginal density functions, Joint density functions, discrete probability distributions - Binomial, Poisson distribution, Continuous probability distributions- uniform distribution and normal distribution. Expectation-basic properties

Module 3:-Basic Statistics

Measures of central tendency: - mean, median, mode, measures of dispersion, range, Mean deviation, Quartile deviation and standard deviation, Skewness and Kurtosis, linear correlation, Karl Pearson's coefficient of Correlation, rank correlation and linear regression.

Module 4:- Sampling and Estimation

Theory of Sampling: - Population and sample, Types of sampling

Theory of Estimation: - Introduction, point estimation, methods of point estimation-Maximum Likelihood estimation and method of moments, Central Limit Theorem-Statement only.

Module 5:-Testing of hypothesis and inference

Null and alternative hypothesis, types of errors, level of significance, critical region, one tail and two-tail test. Small sample tests – t Test-for single mean, difference of means. Paired t-test, Chi-square test- Concept of test statistic ns^2/σ^2 , F test - test for equality of two population variances. Large sample test-test for single mean and difference of Means

Text Book:

1. Fundamentals of statistics: S.C.Gupta, 6th Revised and enlarged edition-April 2004, Himalaya Publications

Reference Books:

1. Introduction to Probability and Statistics, Medenhall, Thomson Learning , 12 Edn
2. Fundamental of Mathematical Statistics by S.C.Gupta ,V.K.Kapoor. Sultan Chand Publications.
3. Introduction to Mathematical Statistics by Robert V. Hogg &Allen T. Craig. Pearson education.

MCA 103 - DIGITAL SYSTEMS AND COMPUTER HARDWARE

Module I - Number Systems and Code:

Introduction - Digital and analog systems. Logic levels and pulse waveforms. Functions of digital logic. Data transmission. Digital integrated circuits.

Number systems - Decimal and binary number systems. Decimal to binary and binary to decimal conversion. Addition, subtraction, multiplication and division of binary numbers. Representation of signed numbers. Addition and subtraction using 2's complement and 1's complement. Octal number system. Hexadecimal number system. Octal and hexadecimal arithmetic. Conversion between binary, octal and hexadecimal number systems.

Binary codes - 8421 BCD code. Excess 3 code. Gray code. Error detecting codes – parity, check sum. Error correcting code – 7 bit Hamming code. Alpha numeric codes.

Module II -Logic gates and combinational circuits:

Logic gates - AND, OR, NOT, NAND, NOR, Exclusive OR, Exclusive NOR gates - Logic symbols, truth tables and Boolean expressions. Inhibit circuits. Logic symbols. Pulsed operation of logic gates. Universal gates. Realisation of AND, OR, NOT functions using universal gates. DeMorgan's theorems. **Combinational circuits**- Half adder, Full adder, Half subtractor, Full subtractor, parallel binary adder. Two's complement addition and subtraction using parallel adder. Serial adder. Parity bit generator. Comparator.

Module III - Flip Flops and Shift Registers :

Flip Flops - SR latch using NOR gates and NAND gates. Gated latch. Edge triggered Flip Flops. Generation of narrow spikes. SR, D, JK and T Flip Flops.

Shift registers - Buffer register. Serial in serial out, serial in parallel out, parallel in serial out, parallel in parallel out shift registers – Logic diagram and timing diagram. Bidirectional shift register. Universal shift register. Dynamic shift register.

Module IV - Basic Components of a Computer:

Basic components of a digital computer(block diagram explanation)

CPU & Memory – CPU, ALU, Control Unit & Registers, RAM, Variants of RAM, ROM, Variants of ROM, **Physical Memory organization:** DIP, SIMM, DIMM, SIPP, **ROM BIOS & CMOS** – Boot Up Process, POST

I/O devices: Input and Output devices, Printers, Display Devices, Scanners

Mother Board: CPU socket, Memory and secondary Cache sockets or chips, ROMBIOS and BIOS CMOS, Universal serial bus

Module V - Secondary Storage Devices :

Hard Disk Hard disk drive components, disk platter, read/ write head, head arm/ head slider, spindle motor, logic board, air filter, head actuator mechanism.

Disk Geometry : Sides or heads, track, cylinder, sector

Disk Recording: Data recording method, writing on reading from a magnetic disk, data encoding methods, FM, MFM, RLL, encoding scheme, interleave, skew.

Hard Disk Interfacing : Concepts of Interfacing **Formatting** : Low level and high level.

Other Secondary Storage devices: Floppy disk, CD Family, DVD, ZIP Drive

Text Book

1. Fundamentals of Digital circuits: A. Anand Kumar, Prentice Hall of India
2. All About Hard Disk, Manohar Lotia
3. All About Motherboard, Manohar Lotia

References:

1. Digital Logic Applications and Design, John M. Yarbarough, Thomson Learning , I Edn
2. Fundamentals of Logic Design, Charles Roth, Thomson Learning , 5 Edn
3. Digital logic and Computer Design, Morris Mano, Prentice Hall of India.

MCA 104 : PRICIPLES OF MANGEMENT AND ACCOUNTING

Module I : Introduction , Planning and Organising

Introduction to Management - Understanding the meaning and definitions and Management, Nature of Management an art or science, Importance of Management in to day's organizations, An overview of management processes - Planning, Organizing, Staffing, Directing, Coordinating and controlling, Evolution of Management Though - the classical school, the Behaviourial Approach, the Management Science Approach, the Contingency Approach and the systems Approach. Planning - Strategy, plan, policy and programs; purpose of planning; Mission, Vision and goal setting; and SWOT Analysis, Forecasting - need of forecasting in Planning; Types of Planning; Organizing - Principles and structure

of organization, Theories and types of organization, Concept of : Authority, Responsibility, Power, Delegation & Centralisation of Authority, Span of Control. Formal and informal organizations

Module II : Staffing, Leading, Controlling

Staffing - Human Resources Management and Selection, Performance Appraisal ,Managing Change through Management and Organisation Development . Leading – Human Factors and Motivation, Leadership. Communication and Controlling - Communications in the Organization, Communication Process, types ,barriers and guidelines for effective communication, Concepts and Principle of Controlling, Basis Control Processes, Feed forward Control Mechanisms, Essentials of a good control system.

Module III : Applications of Managerial Functions

Production and Operations Management - Production planning and control, Quality control. Marketing Management - Overview of Marketing function, Product, Price, Promotion and Distribution strategies, Marketing Research and its role. International Management

Module IV: Introduction to Accounting and Financial Accounting

Accounting Theory, Accounting Process, Financial Statements - Meaning and Types of Financial Statements, Nature of Financial Statements, Limitations of Financial Statements, Analysis and Interpretation of Financial Statements, Depreciation. [Company Final Accounts: Familiarity with the requirements of Schedule VI to the Companies Act 1956, Elementary Knowledge about Items in the Profit & Loss Account and Balance Sheet of a Company.]

Module V: Management Accounting

Management Accounting Theory ,Ratio and Cash Flow Analysis - Classification of Ratios, Profitability Ratios, Turnover Ratios, Financial Ratios, Advantages of Ratio Analysis, Limitations of Ratio Analysis, Break-even Analysis, Capital Budgeting : Theory of Budgeting - principles , functions, advantages and limitations

Text Books:

1. Essentials of Management: Harold Koontz and Heinz Weihrich,6th Edition ,Tata McGrawHill
2. Accounting for Management : N.P.Srinivassan and M. Sakthivel Murugan, S. Chand & Co. , 2004

References:

1. Essentials of Management : Josph L. Massie,4th Edition , Prentice Hall of India
2. Management Accounting, Hansen, Thomson Learning , 7 Edn
3. Essentials of Management Accounting : I. M. Pandey, Vikas Publishing House Pvt. Ltd., 2003
4. Finial Accounting for Managers : T. P. Ghosh, Taxman Allied Services (P) Ltd., 2004.
5. Finial Accounting , Warren, Thomson Learning , 8 Edn
6. Finial Accounting Reporting and Analysis , Stice, Thomson Learning , 7 Edn

MCA 105- Problem Solving and Programming in C

Module I

Introduction to programming: Programming languages, Compiler, interpreter, loader and linker, program execution, fourth generation language, fifth generation language, structured programming concept, algorithm and flowchart

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, offsetting a pointer

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

Addition a features of C: Enumeration, Command line parameters, macros, the c Preprocessor

Text book

Programming with c – Byron s Gottfried second edition – Schaum’s outlines

Reference

1. Computer Science: A Structured Programming Approach Using C, Forouzan, Thomson Learning , 2 Edn
2. Programming in c –Pradip Dey, Manas Ghosh – Oxford Higher Education
3. A First Book of ANSI C, Bronson, Thomson Learning , 3 Edn
4. Understanding pointers in c- Yashavant Kanetkar – BPB publication
5. Let us c - Yashavant Kanetkar – BPB publication
6. The c programming language – Brian W Kernighan & Dennis Ritchie IInd edition Eastern Economy Edition
- 7 C by discovery – l s Foster
8. Working with c - Yashavant Kanetkar – BPB publication
9. Instant c program – Ivor Horton – Wrox
10. The art of programming computer science with ‘c’ – Steven c Lawlor - Wess

MCA 106 C Programming Lab

Section A

1. Implementation of the various Data Types in C.
2. Demonstration of Data type conversion (Hint: Usage of type casting).
3. Implementation of various Storage Types.
4. Demonstration of for loop.
5. Demonstration of do...while loop.
6. Demonstration of while loop.
7. Demonstration of nested if (Hint: Use logical operators).
8. Demonstration of switch... case structure.
9. Implementation of arrays (Hint: character arrays)
10. Implementation of multidimensional arrays (Hint: implement matrix operation).
11. Implementation of functions (Hint: Demonstrate call by value, call by schemes, passing of arrays).
12. Demonstration of various string operations (Hint: Usage of user defined functions only allowed).
13. Demonstration of pointer operations.
14. Demonstration of macro processing.
15. Demonstration of recursion (Hint: GCD, factorial, Fibonacci series).

Section B

16. Implementation of structures (Hint: simple structure operations, array of structures).
17. Implementation of Union.
18. Implementation of pointers to structures and unions.
19. Demonstration of dynamic allocation of memory (Hint: malloc, calloc, realloc, free).
20. Demonstration of sorting techniques (Hint: selection sort, bubble sort).
21. Demonstration of searching techniques (Hint: linear search, binary search).
22. Demonstration of bitwise operations.
23. Demonstration of various file operations.

MCA 107 - PC HARDWARE LAB

1. Identification of PC Components and Assembling the PC
2. Installation of Operating Systems and formatting the Hard Disk
3. Replacing and fitting of Hard Disk and Floppy Disk on PC
4. Identification of different cards in the PC
5. Setting of jumpers for Interrupt Request on mother Board
6. PC Tools and its use
7. Disc Managers and its use
8. Virus removal and disc scan
9. Connecting input devices and installing their driver software
10. Replacing and fitting Processors, Motherboards and Memory.

Text Book :

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