## COURSE STRUCTURE
Master of Computer Applications

### Year – I, Semester – I

<table>
<thead>
<tr>
<th>Course Code</th>
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Integral University, Lucknow
Department of Computer Application
DISCRETE MATHEMATICS
MCA 101

UNIT-I
Relation: Type and compositions of relations, Pictorial representation of relations, Closures of relations, Equivalence relations, Partial ordering relation.
Function: Types, Composition of function, Recursively defined function
Mathematical Induction: Piano’s axioms, Mathematical Induction
Discrete Numeric Functions and Generating functions
Simple Recurrence relation with constant coefficients, linear recurrence relation without constant coefficients, Asymptotic Behavior of functions
Algebraic Structures: Properties, Semi group, Monoid, Group, Abelian group, Properties of group, Subgroup, Cyclic group, Cosets, Permutation groups, Homomorphism, Isomorphism and Automorphism of groups.

UNIT –II
Propositional Logic: Preposition, First order logic, Basic logical operations, Tautologies, Contradictions, Algebra of Proposition, Logical implication, Logical equivalence, Normal forms, Inference Theory, Predicates and quantifiers, Posets, Hasse Diagram.

UNIT-III
Introduction to defining language, Kleene Closure, Arithmetic expressions, Chomsky Hierarchy, Regular expressions, Generalized Transition graph.

UNIT-IV
Finite Automate: Conversion of regular expression to Finite Automata, NFA, DFA, Conversion of NFA to DFA, Optimizing DFA, FA with output: Moore machine, Mealy machine, Conversions.

UNIT-V
Non-regular language: Pumping Lemma, Myhill Nerode Theorem, Pushdown Automata, and Introduction to Turing Machine and its elementary applications to recognition of a language and computation of functions.

REFERENCES
1. Liptschutz, Seymour, “Discrete Mathematics”, TMH
3. Hopcroft J.E, Ullman J.D., “Introduction to Automata theory, Languages and
5. Kolman,Busby ,Ross-Discrete Mathematical Structres
PRINCIPLES OF MANAGEMENT AND ORGANITIONAL BEHAVIOR

MCA - 102

UNIT-I
Basic of Management:
Meaning, Importance and Scope of Management, Evolution of Thought and Various Approaches to Management, Social Responsibility of Managers, Problems and Challenges and Challenges to Managers in India.

UNIT-II
Functions of Management:

UNIT-III
Economics in Management:
Basic Concept, Managerial Approach to Economics, Demand and Supply, Profit and Outputs, Marginal and Incremental, Opportunity Cost and Optimization, Demand Analysis, Elasticity of Demand and Supply, Principles of Profit Maximization.

UNIT-IV
Organizational Behavior:
Understanding and Managing Individual Behavior - Personality, Perception, Attitudes;

UNIT-V

REFERENCES
UNIT-I
Representation of Information & Basic Building Blocks:
ALU-Chip, Faster Algorithm and Implementation (Multiplication & Division)

UNIT-II
Basic Organization:

UNIT-III
Memory Organization:
Memory Hierarchy, Main Memory (RAM/ROM) Chips), Auxiliary Memory, Associative Memory, Cache Memory, Virtual Memory, Memory Management Hardware, Hit/Miss Ratio, Magnetic Disk and its Performance, Magnetic Tape Etc.

UNIT-IV
I/O Organization:

UNIT-V
Process Organization:
Basic Concept of 8-Bit Micro Processor (8085) and 16-Bit Micro Processor (8086), Assembly Instruction Set, Assembly Language Program of (8085):
Addition of Two Numbers, Subtraction, Block Transfer, Find Greatest Number, Table Search, Numeric Manipulation, Introductory Concept of Pipeline, Flynn's and Feng's Classification.

REFERENCES
1. Mano Morris, "Computer System Architecture" PHI
3. B. Ram, "Computer Fundamental Architecture & Organization" New Age
5. Tannenbaum, "Structured Computer Organization” PHI.
UNIT - I
**Introduction to Computers:** Computer Hardware Components, Disk Storage, Memory, Keyboard, Mouse, Printers, Monitors, CD etc., and their Functions, Comparison Based Analysis of Various Hardware Components.

**Basic Operating System Concepts:** MS-DOS, Windows, Functional Knowledge of These Operating Systems.

UNIT - II
Introduction to Basic Commands of DOS, Managing File and Directories in various Operating Systems.

**Internet:** Introduction to Internet, Basic Terms Related with Internet, TCP/IP.

**Programming in C:** History, Introduction to C Programming Language, Structure of C Programs, Compilation and Execution of C Programs. Debugging Techniques, Data Types and Sizes, Declaration of Variables, Modifiers, Identifiers and Keywords, Symbolic Constants.

UNIT - III
Storage Classes (Automatic, External, Register and Static), Enumerations, Command Line Parameters, Macros, The C Preprocessor

**Operators:** Unary operators, Arithmetic & logical operators, Bit wise operators, Assignment operators and expressions, Conditional expressions, precedence and order of evaluation.

Control Statements: if-else, switch, break, continue, the comma operator, goto statement.

Loops: for, while, do-while.

UNIT - IV
**Functions:** Built-in and user-defined, function declaration, definition and function call, parameter passing: call by value, call by reference, recursive functions, multifile programs.

**Arrays:** Linear arrays, multidimensional arrays, passing arrays to functions, Arrays and strings.

UNIT - V
**Pointers:** Introduction to pointers, Dynamic Memory Allocation, calloc and malloc functions, array of pointers, function of pointers.

**Structure and Union:** Definition and differences, structures and pointers, self-referential structure.

**File Handling in C:** Opening and closing a data file, creating a data file, read and write functions, unformatted data files.

REFERENCES:
1. V. Rajaraman, "Fundamentals of Computers", PHI
2. Pater Norton's "Introduction to Computer", TMH
3. Hahn, "The Internet complete reference", TMH
4. Peter Nortton's, "DOS Guide", Prentice Hall of India
UNIT - I

UNIT- II
Polynomial Interpolation: Newton's Forward and Backward Formula
Central Difference Formulae: Gauss Forward and Backward Formula, Stirling's Bassel's, Everett's Formula.
Interpolation with Unequal Intervals: Lagrange's Interpolation, Newton Divided Difference Formula, Hermite's Interpolation, Approximation of Function by Taylor's Series and Chebyshev Polynomial.

UNIT- III

UNIT-IV
Curve Fitting, Cubic Spline and Approximation: Method of least Squares, Fitting of Straight Lines, Polynomials, Exponential Curves etc.
Frequency Chart: Different Frequency Charts like Histogram, Frequency Curve, Pi-Chart
Regression Analysis: Linear and Non-Linear Regression, Multiple Regression

UNIT-V
Time Series and Forecasting: Moving Averages, Smoothening of Curves, Forecasting Models and Methods, Statistical Quality Control Methods.
Testing of Hypothesis: Test of Significance, Chi-Square Test, T-Test, ANOV A, F-Test Application to Medicine, Agriculture etc.
REFERENCES

1. Rajaraman Y, "Computer Oriented Numerical Methods", PHI
2. Gerald and Wheatley, "Applied Numerical Analyses", AW
7. Francis ScheId, "Numerical Analysis", TMH
COMBINATORICS & GRAPH THEORY  
MCA-106

UNIT-I  

UNIT-II  
Recurrence Relation-Introduction, Linear Recurrence Relation with Constant Coefficients, Homogeneous Solution, Particular Solution, Total Solution, Solution by the Method of Generating Function.

UNIT-III  
Graphs, Sub-Graphs, Some Basic Properties, Walks, Path & Circuits, Connected Graphs, Disconnected Graphs and Component, Euler and Hamiltonian Graphs, Various Operations on Graphs, Tree and Fundamental Circuits, Distance Diameters, Radius and Pendent Vertices, Rooted and Binary Trees, Counting Trees, Spanning Trees, Finding all Spanning Trees of a Graph and a Weighted Graph.

UNIT-IV  
Indicidence Matrix of Graphs, Sub Matrices of A(G), Circuit Matrix, Cut Set Matrix, Path Matrix and Relationship Among A, B, C Fundamental Circuit Matrix and Range of B Adjacency Matrix, Rank Nullity Theorem.

UNIT-V  
Coloring and Covering, Partitioning of Graph, Chromatic Number, Chromatic Partitioning, Chromatic Polynomials, Matching, Covering, Four Color Problem, Directed Graph, Types of Directed Graphs, Directed Paths and Connectedness, Euler Digraph, Trees with Directed Edges, Fundamental Circuit in Digraph, Matrices A, B, C of Digraph Adjacency Matrix of Digraphfenumeration and its Types, Counting of labeled and Unlabeled Trees, Polya's Theorem, Graph Enumeration with Polya's Theorem, Graph Theoretic Algorithm.

REFERENCES:
1. Deo Narsing, Graph Theory with applications to engineering and computer science", PHI
2. Tremblay and Manohar, Discrete mathematical structures with applications to computer Science", TMH
4. John Truss, "Discrete mathematics for computer scientist"
5. C.L. Liu, "Discrete mathematics"
• Write C Program to find largest of three integers.
• Write C Program to check whether the given string is palindrome or not
• Write C Program to find whether the given integer is
  (i) A prime number
  (ii) An Armstrong number.
• Write C Program for Pascal triangle
• Write C Program to find sum and average of n integers using linear array
• Write C Program to perform addition, multiplication, transpose on matrices
• Write C Program to find factorial of n by recursion using user defined functions
• Write C program to perform following operations by using user defined functions
  (i) Concatenation
  (ii) Reverse
  (iii) String Matching
• Write C Program to find sum of n terms of series
  \[ n - n \times \frac{2}{2!} + n^{3}/3! - n^{4}/4! + \ldots \]
• Write C Program to interchange two values using
  (i) Call by value
  (ii) Call by reference.
• Write C program to sort the list of integers using dynamic memory allocation
• Write C program to display the mark sheet of a student using structure
• Write C Program to perform following operations on data files
  (i) read from data file
  (ii) Write to data file
• Write C program to copy the content of one file to another file using command line argument
COMPUTER ORGANIZATION LAB

MCA-172

- Study and Bread Board Realization of Logic Gates, K-Map, Flip-Flop equation, realization of characteristic and excitation table of various Flip Flops
- Implementation of Half Adder, Full Adder and Subtractor
- Implementation of Ripple Counters and Registers
- Implementation of Decoder and Encoder circuits
- Implementation of Multiplexer and D-Multiplexer circuits
NUMERICAL METHOD LAB

MCA-173

- To implement floating point arithmetic operations i.e., addition, subtraction, multiplication and division
- To deduce errors involved in polynomial interpolation. Algebraic and transcendental equations using Bisection, Newton Raphson, Iterative, method of false position, rate of conversions of roots in tabular form for each of these methods.
- To implement formulae by Bessels, Newton, Stirling, Langranges etc
- To implement method of least square curve fitting
- Implement numerical differentiation
- Implement numerical integration using Simpson's 1/3 and 3/8 rules, trapezoidal rule
  - To show frequency chart, regression analysis, Linear square fit, and polynomial fit