PG DEPARTMENT OF COMPUTER SCIENCES
University of Kashmir

Annexure-I to the Departmental Committee Meeting Minutes held on 13 & 15 Feb, 2025

Entrance Examination Syllabus for MCA Programme effective from Batch/Year 2025

Note: The main objective of this paper is to assess the general aptitude of the candidate to pursue a computer applications and software/IT profession. There shall be sixty questions, each carrying one mark. Weightage to be given to each section is given within parenthesis. Paper setters are required to set the required number of multiple choice type questions with only one correct or most appropriate answer, separately for each section, giving uniform representation to the whole syllabus contained therein.

Unit-1: General Logical & Reasoning Ability [4 Marks]

Logical and Mathematical Reasoning. Problems based on general concepts- Ratios and proportions, problems on time-work, distance-speed, percentage, etc. Blood relations, Sequence and Series, Coding and Decoding, Visual reasoning, Analytical reasoning and General Aptitude.

Unit-2: Mathematics at 12th standard [4 Marks]

Algebra: Fundamental operations in Algebra, Expansion, factorization, Quadratic equations, indices, logarithms, arithmetic, geometric and harmonic progressions, binomial theorem, permutations and combinations.

Unit-3: IoT Fundamentals [4 Marks]

IoT: Definition and basic concept of IoT, Evolution and importance of IoT in various domains (e.g., healthcare, smart cities, agriculture)

Unit-4: Co-ordinate Geometry [4 Marks]

Rectangular Cartesian co-ordinates, equations of a line, mid-point, intersections etc., equations of a circle, distance formulae, pair of straight lines, parabola, ellipse and hyperbola, simple geometric transformations such as translation, rotation, scaling.

Differential Equations: Differential equations of first order and their solutions, linear differential equations with constant coefficients, homogenous linear differential equations.

Unit-5: Probability and Statistics & Sets [4 Marks]

Basic concepts of probability theory, Averages, Dependent and independent events, frequency distributions, and measures of dispersions, Skewness and Kurtosis, random variable and distribution functions, mathematical expectations, Binomial, Poisson, normal distributions, curve fitting, and principle of least squares, correlation and regression. Set, relations and mappings.

Unit-6: Mensuration & Matrices ***[4 Marks]***

Mensuration: areas, triangles and quadrilaterals, area and circumference of circles, volumes and surface areas of simple solids such as cubes, spheres, cylinders and cones.

Matrices: Determinants, Addition, Multiplication, Transpose, Inverse. Rank of a matrix and other basic operations.

Unit-7: Computer Fundamentals ***[4 Marks]***

History of Computer, Characteristics of Computer, Classification of Computer. Applications of Computer, Organization of a Computer, Hardware, Software, Firmware, Central Processing Unit (CPU), Input /Output devices, Secondary Storage devices, Memory Organization, back-up devices. Introduction to Internet and email. Functions of Operating System. Classification of Operating System. Viruses - Types and Control measures.

Unit-8: Data Representation **& Architecture** ***[4 Marks]***

Representation of characters, integers, and fractions, binary, decimal, octal and hexadecimal representations and inter-conversions, Binary Arithmetic-Addition, subtraction, division, multiplication, One's complement arithmetic and two's complement arithmetic, floating point representation of numbers, normalized floating point representation, Boolean algebra, truth tables, Venn diagrams.

Computer Architecture: Organization of CPU, Hardwired and Micro-programmed CU, Register Organization and Instruction formats. Instruction set- register transfer, arithmetic, logic and shift operations. Addressing modes. Memory Management, Associative Memory, cache memory, virtual memory, Introduction to 8086 instruction set.

Unit-9: Computer Programming in C and C++ ***[4 Marks]***

C-language fundamentals, Basic Constructs-Loops, control statements, Arrays, Functions, Structures and Unions, Pointers, Files. Object Oriented Paradigm (OOPs), Classes, Objects, Abstraction, Polymorphism, Inheritance, Encapsulation, Constructors, Destructors, Inline and friend function, dynamic and static binding, virtual class, Virtual functions, Operator overloading and function overloading

Unit-10: DBMS ***[4 Marks]***

Introduction, Database Vs File Systems, DB Users, DBMS- Basic Concepts and Terminology, Models and Architecture. Relational algebra and Relational DBMS. Normalization. Elements of Structured Query Language, Transaction Management, Concurrency control techniques, Recovery techniques, Different Types of Files like Sequential, Index based Files, etc.

Unit-11: Data Structures ***[4 Marks]***

Introduction, Algorithmic complexity, Stacks, Queues, linked Lists. Sorting techniques and Searching Techniques: Quick Sort, Merge Sort, Heap Sort, Bubble sort, Selection sort, and Insertion sort. Linear and binary search algorithms. Trees and Graph terminology and representation in memory, binary tree, traversal techniques of graphs

Unit-12: Operating System ***[4 Marks]***

Introduction, Operating System Organization, Process Management, Physical and virtual address space; memory allocation strategies, File and I/O Management, Protection and Security.

Unit-13:* Artificial Intelligence** ***[4 Marks]

Introduction: Introduction to Artificial Intelligence, Background and Applications, Turing Test and Rational Agent approaches to AI, Introduction to Intelligent Agents, their structure, behavior and environment. Problem Solving and Searching Techniques: Problem Characteristics, Production Systems, Control Strategies, Breadth First Search, Depth First Search, Hill climbing and its Variations, Heuristics Search Techniques: Best First Search, A* algorithm, Constraint Satisfaction Problem, Means-End Analysis, Introduction to Game Playing, Min-Max and Alpha-Beta pruning algorithms.

Unit-14: Theory of* Computation** ***[4 Marks]

Languages, Finite Automata and Regular Languages, Context free languages, Turing Machines and Models of Computations.

Unit-15: Computer Networks ***[4 Marks]***

Introduction to Computer Networks, Data Communication Fundamentals and Techniques, Networks Switching Techniques and Access Mechanisms, Data Link Layer Functions and Protocol, Multiple Access Protocol and Networks, Networks Layer Functions and Protocols, Transport Layer Functions and Protocols, Overview of Application layer protocol.