1-Year MCA

Annexure-I to the Departmental Committee Meeting Minutes held on 27th November, 2025

Entrance Examination Syllabus for 1-Year MCA Programme under NEP-202 effective from Batch/Year 2026

Unit-1: Computing Mathematics ***[4 Marks]***

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

Unit-2: 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-3: 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-4: 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-5: 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-6: Computer Programming in C and C++ ***[4 Marks]***

C-language fundamentals, Basic Constructs-I-oops, 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-7: 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-8: 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-9: 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-10: Artificial Intelligence [4 Marks]

Introduction: Introduction to Artificial Intelligence, Background and Applications, Turing Test and Rational Agent approaches to Al, 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-11: Theory of Computation [4 Marks]

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

Unit-12: 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.

Unit-13: Software Engineering [4 Marks]

Concept and Nature of Software, Software Crisis, Software Engineering – Concept, Goals and Challenges, Software Engineering Approach; Software Development Process, Process Models - Waterfall Model, Evolutionary and Throwaway Prototyping Model, Incremental and Iterative Models, Spiral Model, Agile Process Model, Component based and Aspect Oriented development.

Unit-14: Cyber Security [4 Marks]

Introduction to Cybersecurity: Defining cybersecurity and its importance, The CIA triad: Confidentiality, Integrity, and Availability, Types of cyber threats and vulnerabilities, Cybercrime and Its Types: Understanding cybercrime and its motivations, Types of Cyber Attackers- White, grey and black hat, Common types of cybercrime: hacking, phishing, malware, ransomware, Methods of Infiltration: Social Engineering, Denial-of-Service, distributed DoS, Botnet, password attacks, The impact of cybercrime on

individuals, organizations, and society, Security Vulnerability & Exploits: Hardware vulnerability, software vulnerability. Remedial and Mitigation Measures: Implementing security controls to prevent cyberattacks, Network security: firewalls, intrusion detection systems, access control, Endpoint security: antivirus, antimalware, software updates, User awareness and training: educating users about cybersecurity threats and best practices.

Unit-15: Cryptography & Network Security [4 Marks]

History of cryptography, Basics of cryptography, Types of cryptographic algorithms, Security implications of cryptography. Classical Ciphers: Caesar Cipher, Mono-alphabetic cipher, Hill cipher, Poly-alphabetic cipher (Vegnere Cipher), One-time pad, Transposition Cipher (Rail-fence Cipher). Introduction to Number Theory: Prime Number Generation and Testing for Primality, Fermat's and Euler's Theorems. Symmetric Key Cryptography: Principles of symmetric key cryptography, Encryption and decryption algorithms, Claude Shannon's Theory of Diffusion and Confusion, Avalanche Effect, Feistel Cipher, Common symmetric key algorithms (e.g., DES, Triple DES, AES)

Unit-16: Design & Analysis of Algorithms [4 Marks]

Introduction to Algorithms, Analysis of Algorithms, Growth of functions, Asymptotic Notations (Big-O, Big-Omega, Big-Theta), Complexity Analysis Techniques (Substitution method, Recursion Tree), Masters Theorem, Tower of Hanoi problem and its complexity.

Search Algorithms (Linear Search, Binary Search), Sorting Algorithms (Selection Sort, Insertion Sort, Bubble Sort, Quick Sort, Merge Sort). Time complexity analysis of searching and Sorting algorithms, Introduction to Divide and Conquer strategy, Greedy method, Knapsack problem.