

**Syllabus of Written Examination for the Post of Assistant Professor
(Computer Science & Engineering)**

| Contents | Marks out of 100 |
|---|------------------|
| Discrete Mathematics and Probability Propositional and first order logic. Sets, relations, functions, partial orders and lattices. Groups. Graphs: connectivity, matching, coloring. Combinatorics : counting, recurrence relations, generating functions. Probability: Random variables. Uniform, normal, exponential, poisson and binomial distributions. Mean, median, mode and standard deviation. Conditional probability and Bayes theorem. | 7 |
| Digital Logic and Boolean Algebra. Combinational and sequential circuits. Boolean Algebra Minimization. Number representations and computer arithmetic (fixed and floating point). | 7 |
| Computer Organization and Architecture Machine instructions and addressing modes. ALU, data-path and control unit. Instruction pipelining. Memory hierarchy: cache, main memory and secondary storage; I/O interface (interrupt and DMA mode). | 7 |
| Programming and Data Structures Programming in C/C++. Recursion. Arrays, stacks, queues, linked lists, trees, binary search trees, binary heaps, graphs. | 8 |
| Algorithms Searching, sorting, hashing. Asymptotic worst case time and space complexity..Algorithm design techniques: greedy, dynamic programming and divide-and-conquer. Graph search, minimum spanning trees, shortest paths. | 10 |
| Theory of Computation Regular expressions and finite automata. Context-free grammars and push-down automata. Regular and contex-free languages, pumping lemma. Turing machines and undecidability. | 8 |
| Compiler Design Lexical analysis, parsing, syntax-directed translation. Runtime environments. Intermediate code generation, optimization. | 10 |
| Operating System and System Software Processes, threads, inter-process communication, concurrency and synchronization. Deadlock. CPU scheduling. Memory management and virtual memory. File systems. Distributed operating System. System Software: linker, loader and interpreter. | 8 |
| Databases ER-model. Relational model: relational algebra, tuple calculus, SQL. Integrity constraints, normal forms. File organization, indexing (e.g., B and B+ trees). Transactions and concurrency control. Distributed databases. | 6 |
| Computer Networks and Network Security Concept of layering.LAN technologies. Flow and error control techniques, switching. IPv4/IPv6, routers and routing algorithms. TCP/UDP and sockets, congestion control. Application layer protocols. Network security: authentication, public key and private key cryptography, digital signatures and certificates, firewalls. Mobile and wireless communication network. | 10 |
| Software Engineering Software development models, required analysis, software architecture, design, coding, testing maintenance, project planning estimation. | 6 |
| Data Science Data warehouse, data mining, Big data and Predictive Analytics. | 6 |
| Artificial Intelligence Knowledge representation and its uses, Artificial Neural Network, fuzzy logic and genetic algorithm. Machine learning. | 7 |

