

DETAILED SYLLABUS FOR THE POST OF ASSISTANT PROFESSOR IN INFORMATION TECHNOLOGY

(Cat.No. : 726/2021)

(Total Marks- 100)

Module I - Computer Organization & Architecture

(15 Marks)

Digital Logic: Logic Functions, minimization, design and synthesis of combinational and sequential circuits, number representation and computer arithmetic (fixed and floating point).

Computer Organization: Machine instructions and addressing modes, ALU, CPU control design, memory interface, I/O interface, DMA, interrupts pipelining, memory hierarchy, parallel computer models.

Microprocessors: Internal architecture of 8085 and 8086, interfacing with peripheral devices, microcontrollers.

Module II - Programming Language, Data Structures & Algorithms

(25 marks)

Object Oriented Programming: Object oriented concepts, programming in C++, Java

Programming Language Concepts: Parameter passing, binding, scope, recursion, functional and logic languages.

Problem solving using Python: Expressions and Statements, Evaluation of Expressions, Strings, String traversal, String Slices, List, Matrices, Tuples, Dictionaries, Python function, Lambda function, Mathematical function

Data Structures: Arrays, stacks, queues, linked lists, trees, binary search trees, binary heaps, graphs.

Algorithms: Analysis, space and time complexity, Design - greedy approach, dynamic programming, divide and conquer, sorting and searching, complexity classes - P, NP, NP-hard, NP-complete.

Module III - Computing and System design

(25 Marks)

Discrete Structures: Sets, relations, functions, groups, partial orders, lattice, algebraic structures.

Theory of Computation: Regular languages and finite automata, context-free languages & pushdown automata, recursively enumerable sets & Turing machines, undecidability.

Compiler Design: different phases of a compilers, different automata, context free grammars for lexical analysis and parsing, top-down parsers and bottom-up parsers, code optimization techniques and code generation issues

Operating systems - processes, threads, inter-process communication, synchronization, deadlocks, CPU scheduling, memory management and virtual memory, file systems, I/O systems, protection & security.

Databases: ER model, relational algebra, tuple calculus, database design, integrity constraints, normalization, SQL, B-trees, B+ trees, transactions and concurrency control.

Software Engineering: Software process models, planning and managing a software project, design, implementation, software testing, quality models and maintenance.

Module IV - Networking & Web Technology

(20 Marks)

Computer Networks: Layered architecture, LAN technologies, wireless LAN, flow and error control, routing algorithms, congestion control, TCP/UDP and sockets, IPv4, IPv6, ARP, RARP, ICMP, DNS, SMTP, POP, FTP, HTTP, MIME, RIP, BGP, OSPF, Hubs, switches, routers and gateways

Cryptography and Network security: Security mechanisms, Traditional secret key ciphers, DES, AES, SHA, MAC, RSA, El-Gamal, Diffie- Hellman Key Exchange, Man in the middle Attack, Digital Signature, IP security, Firewall, Intrusion Detection System, DDoS

Web Technologies and WAD: HTML, CSS, XML, Web server, Proxy server, JavaScript, JSON, DOM, MVC architecture, e-commerce, web services.

Module V – Data Science and Machine Learning (15 Marks)

Data Science:

Supervised and Unsupervised learning, Regression and Classification, Decision Trees, Principal Component Analysis, Support Vector machines, Cross validation and Bootstrapping, Clustering Algorithms, Mining frequent Patterns and Associations, Apriori Algorithms

Soft Computing: Hard Computing and Soft Computing, Artificial Neural Network, Single layer Feed Forward Network, Multi Layer Feed Forward Network, Recurrent Network, Fuzzy Sets, Fuzzy Relations, Fuzzy membership functions, Fuzzification and Defuzzification methods, Genetic Algorithms

Machine Learning:

Supervised, Unsupervised and Reinforcement Learning, Measuring Classifier Performance, Precision, Recall, ROC Curves, Hidden Markov Models, Bagging, Boosting, Voting, Decision Trees--, Gain Ration, Classification by Regression, Support Vector Machine—Soft Margin Hyper plane, Kernel Functions, Hidden Markov Models.

NOTE: - It may be noted that apart from the topics detailed above, questions from other topics prescribed for the educational qualification of the post may also appear in the question paper. There is no undertaking that all the topics above may be covered in the question paper