SYLLABUS FOR THE POST OF SYSTEM ANALYST

Principle of programming languages

Syntax and Analysis Parsing, Basic Semantics, Data Types, Expressions and Statements, Procedures and Environments, Abstract Data Types and Modules.

Discrete Mathematics, Probability and Statistics

Logic, Sets, Relations, Functions, Combinatorics, Algebraic structures, Graph theory, Recurrence relations, Probability theory: Sample spaces, Events and probability, Discrete probability: Union, Intersection and Compliment of events, Conditional probability, Baye's theorem. Linear correlation coefficient, Linear regression, Non-Linear regression, Multiple correlation and Multiple regression, Theory of sampling and population.

Digital Electronics, Computer Organization and Operating System

Digital Logic Systems and Microprocessors: Boolean expressions, K-maps, TTL and CMOS logic families, combinational logic design, synchronous sequential system design. Microprocessors: 8086 architecture, data transfer scheme and interfaces, Addressing modes.

Computer Organization and Architecture: Von-Neumann architecture of computers. Registers and micro-operations, control logic, processor addressing and bus organization. Processor input/output and DMA. Memory organization and cache coherence.

Operating Systems: CPU scheduling, Deadlocks, Memory management, file systems, disk scheduling. Process, threads and their synchronization. Real Time OS: clock synchronization and task scheduling. System initialization, booting and handling user accounts. Backup and restore, Bourne shell programming for Linux.

Data Structures

Data Structures: Linked List, Stack, Queue, Trees, Searching & Hashing, Graphs-shortest paths, minimum spanning trees; Sorting algorithms.

Database Management System

Keys, E-R Model, Normalization – 1NF to 5NF; Aggregate functions, Nested Sub queries, Views, Joined Relations, Transaction- ACID properties; Concurrency Control, triggers, stored procedures.

Client Server Architectures and Web Programming

Two and three-tier client server architectures, web servers, HTML & XML, Style Sheets, client side scripting-java script and VB script; Server Side Scripting-php, JSP and ASP.NET programming for creating dynamic web pages using database, forms and session; AJAX and SignalR.

Computer networks and Programming

Computer networks and security: TCP/IP & OSI/ISO reference models, functions and protocols of different layers, characteristics of physical media, multiplexing, medium access protocols, introduction to 802.3, 802.4, 802.5, 802.11 LAN technology, IP protocol including routing and congestion control, TCP and UDP, DNS. Email protocols. Symmetric and asymmetric encryption including DES, AES, IDEA, RSA algorithms, key management in symmetric and asymmetric encryption, viruses and trusted systems, Kerberos.

Network Programming: Sockets Programming: TCP Programming

(TELNET, HTTP). UDP Sockets: TFTP, DNS. Secure Sockets (SSL), TLS, SSH, HTTPS, Remote Method Invocation (RMI). Simple Object Access Protocol (SOAP), UDDI, and Web Services.

Software Engineering

System modelling, system engineering process, life cycle models, design and implementation, validation, evolution, automated, process support – software requirements, SRS, feasibility studies - elicitation and analysis - validation - management - system models, context models, behaviour models, data models, object models, object-oriented design, design evolution, real-time software design, critical systems specifications - critical system development, software testing.

Real time Systems

Introduction to real time system, embedded systems and reactive systems; Hard and soft real time systems; handling real time; specification and modelling; design

methods; real time operating systems; validation and verification; real time process and applications; distributed real time systems.

Artificial Intelligence and Machine learning

Importance of AI, Search strategies, Searching game trees, Knowledge representation

Machine learning: Regression, Classification, Clustering, Feature engineering, Evaluation metrics

Blockchain & Applications

Blockchain architecture, Smart contracts, Consensus, Applications

Cyber Security & Privacy

Security principles, Authentication, Access control, Privacy models.

Cloud Computing

Cloud models, Virtualization, Storage, Serverless, Cloud security