

**Syllabus for Recruitment Exam for the Post of
Scientific Officer / Engineer-SB and Scientific/Technical Assistant-A**

Total Duration: 3 Hours

No. of Questions: 120

Sl. No.	Topic
Section A: Generic 35%	
1	Logical Reasoning, Analytical Reasoning Capabilities, Quantitative and Qualitative abilities, General Aptitude.
Section B: Technical (Computer Science) 65%	
1.	Probability and Statistics: Sampling theorems, Conditional Probability, Mean, Median, Mode and standard deviations, Random Variables discrete and continuous distributions, Poisson, Normal and Binomial distribution, correlation and regression analysis.
2.	Digital Computer Principles: Number systems- Binary, Decimal. Octal, and Hexadecimal Conversion, Arithmetic operations, Boolean expression , simplification, Postulates and theorems, Simplifications, K-map, Combinational Logic circuits – Adder, Subtractor, Multiplexer, Demultiplexer, Encode, Decoder, Sequential circuits – SR, JK, T, D, flip flops, shift registers, Asynchronous, synchronous and Module and counters.
3.	Computer Organization and Architecture: Multiprocessors and microcomputers, Machine Instructions and addressing mode. ALU and data-path, CPU control design, Memory interface, I/O interface (Interrupt and DMA mode), Cache and main memory, Secondary storage, Semiconductor memory – Internal organization, SRAM. DRAM,SDRAM, Rambus Memory, ROM Technology, virtual memory, Instruction sequencing , Instruction execution, Hardwired control and microprogrammed control, micro instructions, Instruction pipelining.
4.	Programming and Data Structures : Programming in C, Functions , Recursion, Parameter passing, Scope, Binding; Abstract data types, Arrays, Stacks, Queues, Linked Lists, Trees, Binary search tress, Binary heaps.
5.	Object Oriented Programming: Object Oriented design concept, programming in C++ and on programming languages viz. Java, .Net, Open Source (PHP), Python, GoLang, NodeJS, etc.
6.	Algorithms : Analysis, Asymptotic notation, Notions of space and time complexity, Worst and average case analysis, Design; Greedy approach, Dynamic programming, Divide and conquer; Tree and graph traversals, Connected Components, Spanning trees, Shortest paths, Hashing, Sorting, Searching. Asymptotic analysis (best, worst, average cases) of time and space, upper and lower bounds. Basic concept of complexity classes, N, NP, NP-hard, NP-complete
7.	Databases: ER-model, Relational model (relational algebra ,tuple calculus), Database design (integrity constraints, normal forms), Query languages (SQL), File structures (sequential files, indexing, B and B+ trees), Transactions and concurrency control.
8.	System Software: Lexical analysis, parsing, syntax directed translation, code generation and optimization, Assemblers, linkers and loaders microprocessors operating systems- processes, threads, inter-process communication , synchronization deadlocks , CPU scheduling , memory management and virtual memory , file system , I/O systems , protection and security module.
9.	Information Systems and Software Engineering: Information gathering requirement and feasibility analysis , data flow diagrams, process specifications, input/output design, process life cycle, planning and managing the project , design, coding and testing, implementation, maintenance.
10.	Computer Networks: IOS/OSI stack, LAN technologies (Ethernet, Token Ring), flow and error control techniques, Routing algorithm, Congestion Control, TCP/UDP and sockets IP(v4) Application layer protocol (ICMP, DNS, SMTP, POP, FTP, HTTP, HTTPS): Basic concept of hubs, switches, gateways and routers. Network security: Basic concepts of public key and private key cryptography. Hash function, Digital Signature, Firewalls, User authentication- Token based, Biometric, Remote user authentication, Intrusion detection systems, honey pots, Denial of Service. Wireless network, 2G and 3G Networks, Bluetooth.
11.	Web Technologies: HTML5, CSS3, XML basic concept of client-server computing, web server, proxy server, web application development, MVC architecture, web services, frontend and backend technologies.