SYLLABUS OF WRITTEN TEST FOR RECRUITMENT TO THE POST OF SCIENTIST/ENGINEER 'SC'
ADVERTISEMENT NO.: सैक SAC: 01:2026, Dated 23.01.2026

DOMAIN: COMPUTER SCIENCE ENGINEERING
Post Code – 07 & 08

1) **Mathematics:**
   Discrete Mathematics: Propositional and first order logic. Sets, relations, functions, partial orders and lattices. Monoids, Groups. Graphs: connectivity, matching, coloring.
   Linear Algebra: Matrices, determinants, system of linear equations, eigenvalues and eigenvectors, LU decomposition.
   Calculus: Limits, continuity and differentiability. Maxima and minima. Mean value theorem. Integration.
   Probability and Statistics: Random variables. Uniform, normal, exponential, poisson and binomial distributions. Mean, median, mode and standard deviation. Conditional probability and Bayes theorem.
2) **Computer Organization and Architecture:**
   Machine instructions and addressing modes. ALU, data-path and control unit. Instruction pipelining, pipeline hazards. Memory hierarchy: cache, main memory and secondary storage; I/O interface (interrupt and DMA mode).
3) **Programming Language:**
   Programming in C and Python
4) **Data Structures and Algorithms:** Array, Stack, Queue, Linked list,Ttree, Binary Search Tree, Binary heaps, Graphs. Algorithms for Searching, Sorting and Hashing. Asymptotic worst case time and space complexity. Algorithm design techniques: Greedy, Dynamic programming and Divide-and-conquer. Graph traversals, Minimum spanning tree, Shortest paths.
5) **Theory of Computation**
   Regular expressions and finite automata. Context-free grammars and push-down automata. DFA and NFA. Regular and context-free languages, pumping lemma. Turing machines, decidability and undecidability of problems**.**
6) **Operating System**
   System calls, Threads and Multi threading, Inter-process communication, Process management and Scheduling, CPU Scheduling, Process Synchronization, Deadlocks, Memory Management and Virtual memory, Disk Scheduling, Deadlock, File systems.
7) **Databases**
   ER-model, Relational model, Relational algebra and Calculus, Normalization, Transaction and Concurrency Control, SQL query, Integrity constraints, File organization, indexing (e.g., B and B+ trees), Transactions and concurrency control, Data warehouse, NoSQL.
8) **Computer Networks**
   Computer Network basics, OSI and TCP/IP models and Protocol Stacks, Basics of packet circuit and virtual circuit-switching, Physical layer: Network Topology, Transmission modes and media. Data link layer: Framing, Error detection, Medium Access Control (MAC), Ethernet bridging. Network layer: Routing protocols: shortest path, flooding, distance vector and link state routing; Fragmentation and IP addressing, IPv4, CIDR notation, class and subnet for IP addresses, Basics of IP support protocols (ARP, DHCP, ICMP), Network Address Translation (NAT). Transport layer: UDP, flow control and congestion control, Session, Presentation and Application layer: DNS, SMTP, HTTP/S, FTP/S, SFTP, Email, Compression, Encryption, firewall.

9) Image and Vision Processing:

Image formation and Sensing, Sampling and Quantization, Gray Level Transformations, Color Image Processing, Histogram Processing, Spatial domain Filters, Edge detection, Morphological Filters, Fourier Transform, Frequency domain Filters, Image Compression, Principal Component Analysis (PCA).

10) Artificial Intelligence (AI) and Machine Learning (ML):

Supervised Learning: Regression: linear regression, Ridge regression, Logistic regression; Classification: K-nearest neighbour, Naïve Bayes classifier, Linear Discriminant Analysis (LDA), Support Vector Machine, Decision tree and Random Forest algorithms. **Unsupervised Learning**: Clustering algorithms: K-means, K-Medoids, Hierarchical clustering, Top-down and Bottom-up clustering; Linkage methods: single-linkage, average linkage and ward linkage. **Neural networks**: Single and multilayer feed forward Network, Convolution Neural Network, Deep Neural Network, Performance Evaluation Metrics, Optimizers, Regularization, Loss Function, Transfer learning, and Generative Adversarial Network (GAN).

11) Cyber Security:

Classical Ciphers, Symmetric key Cryptography, Block ciphers, Data Encryption Standard, Advanced Encryption Standard, Stream cipher, Public Key Cryptography, Diffie-Hellman key exchange, RSA encryption, Network Security: Firewalls, IDS and IPS, Incident Response, OWASP Top 10 Web Application Security Risks

Hindi version shall follow.