राष्ट्रीय सूचना प्रबंधक केन्द्र
प्रबंधिक राजपत्राधिक तृतीय श्रेणी, सिस्टम एडमिनिष्ट्रेटर वा सो सरहको पदको खुल्ला प्रतियोगितात्मक परीक्षाको पाठ्यक्रम

प्रथम चरण: लिखित परीक्षा योजना (Examination Scheme)

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<th>उत्तीर्णांक</th>
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<th>प्रश्न संख्या x अंशभार</th>
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द्वितीय चरण

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<td>२०</td>
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</table>
1. Computer Networks
   Protocol stack, switching
   Link Layer: services, error detection and correction, multiple access protocols, LAN addressing and ARP (Address Resolution Protocol), Ethernet, CSMA/CD multiple access protocol, Hubs, Bridges, and Switches, Wireless LANs, PPP (Point to Point Protocol), Wide area protocols
   Transport Layer: principles, multiplexing and demultiplexing, UDP, TCP, flow control, principles of congestion control, TCP congestion control
   Application Layer: Web and Web caching, FTP (File Transfer Protocol), Electronic mail, DNS (Domain Name Service), socket programming
   Distributed system, Clusters

5. Computer Architecture & organization and micro-processors
   5.1 Basic Structures: sequential circuits, design procedure, state table and state diagram, von Neumann / Harvard architecture, RISC/CISC architecture
   5.2 Addressing Methods and Programs, representation of data, arithmetic operations, basic operational concepts, bus structures, instruction, cycle and excitation cycle.
   5.3 Processing Unit: instruction formats, arithmetic and logical instruction.
   5.4 addressing modes
   5.5 Input Output Organization: I/O programming, memory mapped I/O, basic interrupt system, DMA
   5.6 Arithmetic
   5.7 Memory Systems
   5.8 808X and Intel microprocessors: programming and interfacing

6. Digital Design
   6.1 Digital and Analog Systems, Number Systems
   6.2 Logic Elements
   6.3 Combinational Logic Circuits
   6.4 Sequential Logic
   6.5 Arithmetic Circuits
   6.6 MSI Logic circuits
   6.7 Counters and Registers
   6.8 IC logic families
   6.9 Interfacing with Analog Devices
   6.10 Memory Devices

13. Basic Electrical & Electronic
   13.1 Electrical
      13.1.1 Basic Circuit Theory
      13.1.2 AC circuit Fundamentals
      13.1.3 Magnetic circuits and Transf
      13.1.4 Transient Analysis, Filters
13.2 **Electronics**
   13.2.1 Semiconductors, Diodes and Diode Circuits, Transistors,
   13.2.2 Transistor modeling
   13.2.3 Biasing and Amplification
   13.2.4 Small Signal amplifiers and frequency response
   13.2.5 Large signal amplifiers, feedback amplifiers and Oscillators
   13.2.6 Operational amplifiers

14. **Principles of Electronic Communications**
   14.1 Block Diagram of analog/ digital communication system
   14.2 Analog and Digital modulation techniques
   14.3 Fundamentals of Error Detection and Correction
   14.4 Performance evaluation of analog and digital communication systems: SNR and BER

**Section B - 26 %**

2. **Structured and object oriented programming**
   2.1 Data types, ADT
   2.2 Operators, variables and assignments, control structures
   2.3 Procedure/function
   2.4 Class definitions, encapsulation, inheritance, object composition, Polymorphism
   2.5 Pattern and framework

4. **Data structures**
   4.1 General concepts: Abstract data Type, Time and space analysis of algorithms, Big oh and theta notations, Average, best and worst case analysis
   4.2 Linear data structures
   4.3 Trees: General and binary trees, Representations and traversals, Binary search trees, balancing trees, AVL trees, 2-3 trees, red-black trees, self-adjusting trees, Splay Trees
   4.4 Algorithm design techniques: Greedy methods, Priority queue search, Exhaustive search, Divide and conquer, Dynamic programming, Recursion
   4.5 Hashing
   4.6 Graphs and digraphs
   4.7 Sorting

7. **Software Engineering principles (System analysis & design)**
   7.1 Software process: The software lifecycle models, risk-driven approaches
   7.2 Software Project management: Relationship to lifecycle, project planning, project control, project organization, risk management, cost models, configuration management, version control, quality assurance, metrics
   7.3 Software requirements: Requirements analysis, requirements solicitation, analysis tools, requirements definition, requirements specification, static and dynamic specifications, requirements review.
   7.4 Software design: Design for reuse, design for change, design notations, design evaluation and validation
   7.5 Implementation: Programming standards and procedures, modularity, data abstraction, static analysis, unit testing, integration testing, regression testing, tools for testing, fault tolerance
8. Database Management System
8.1 Introduction: The relational model, ER model, SQL, Functional dependency and relational database design, File structure
8.2 Transaction Management and Concurrency Control: Concurrent execution of the user programs, transactions, Concurrency control techniques
8.3 Crash Recovery: types of failure, Recovery techniques
8.4 Query Processing and Optimization
8.5 Indexing: Hash based indexing, Tree based indexing
8.6 Distributed Database Systems and Object oriented database system
8.7 Data Mining and Data Warehousing
8.8 Security Management System

9. Operating System
9.1 Processes and Threads: Symmetric Multiprocessing, Micro-kernels, Concurrency, Mutual Exclusion and Synchronization, Deadlock.
9.2 Scheduling
9.3 Memory Management
9.5 Distributed Systems: Distributed Message passing, RPC, Client/Server Computing, Clusters.

3. Artificial Intelligence
3.1 Search
3.2 Natural Language Processing
3.3 Game Playing
3.4 Learning
3.5 Automated reasoning
3.6 Planning
3.7 Vision and Robotics

10. Theory of Computation
10.1 BNF, Languages, grammars
10.2 DFA and N DFA, regular expressions, regular grammars
10.3 Closure, homomorphism
10.4 Pigeonhole principle, pumping lemma
10.5 CFGs, Parsing and ambiguity, Pushdown automata, NP DAs & CFGs
10.6 Pumping lemma
10.7 Turing machines
10.8 Recursively enumerable languages Unrestricted grammars
10.9 The Chomsky hierarchy, Undecidable problems, Church's Thesis
10.10 Complexity Theory, P and NP
11. Compiler design
11.1 The Structure of a Compiler
11.2 Lexical Analyzer
11.3 Top down Parsing/Bottom up Parsing
11.4 Syntax Directed Translation
11.5 Types and Type Checking
11.6 Run-Time Storage Administration
11.7 Intermediate Code generation
11.8 Data-Flow Analysis and Code Optimizations
11.9 Architecture and recent development on compilers

12.1 Graphics concepts
12.2 Input devices and techniques
12.3 Basic raster graphics algorithms and primitives
12.4 Scan conversion
12.5 Graphics hardware
12.6 2D geometrical transformations and viewing
12.7 3D geometry and viewing
12.8 Hierarchical modeling
12.9 Projections
12.10 Hidden surface removal
12.11 Shading and rendering

15. Emerging Technology and Electives
15.1 Modeling and simulation
15.2 Parallel and distributed computing
15.3 High speed networks
15.4 Artificial Neural Network and Computer Vision
15.5 Adaptive web technology
15.6 Software Architecture
15.7 Distributed Object technology (ORB, DCOM)
15.8 Speech signal processing
15.9 Cryptography and network security
15.10 E-commerce
15.11 Software project management
15.12 Embedded systems
15.13 Image processing
15.14 Multimedia
15.15 Expert system
15.16 GIS/Remote sensing/GPS

Section D-30%

16. Reasoning
16.1 Analytical and logical reasoning
16.2 Quantitative Test
This section covers the examinee's reasoning aptitude as well as the presence of mind. Reasoning is to be done by reading a passage and answering the multiple choice question where as quantitative test is carried out by solving the mathematical problem (which needs no advanced level mathematical background)