

लोक सेवा आयोग  
राष्ट्रिय मानव अधिकार आयोगको राष्ट्रिय मानव अधिकार सेवा, अधिकृत तृतीय श्रेणी, सूचना प्रविधि अधिकृत वा  
सो सरह पदको खुला प्रतियोगितात्मक परीक्षाको पाठ्यक्रम  
द्वितीय पत्र (Paper II): Technical Subject

**Section A**

3 Questions × 10 Marks	30 Marks
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**1. Computer Architecture**

- 1.1. Basic Structures : sequential circuits, design procedure, state table and state diagram, Von Neumann / Harvard architecture, RISC/CISC architecture
- 1.2. Addressing Methods and Programs, representation of data, arithmetic operations, basic operational concepts, bus structures, instruction cycle and excitation cycle
- 1.3. Processing Unit: instruction formats, arithmetic and logical instruction
- 1.4. Addressing modes
- 1.5. Input Output Organization : I/O programming , memory mapped I/O, basic interrupt system, Direct Memory Access (DMA)
- 1.6. Arithmetic Operations
- 1.7. Memory Systems

**2. Operating System**

- 2.1. Processes and Threads: Symmetric Multiprocessing, Micro-kernels, Concurrency, Mutual Exclusion and Synchronization, Deadlock
- 2.2. Scheduling
- 2.3. Memory Management
- 2.4. Input Output and Files: I/O devices and its organization, Principles of I/O software and hardware, Disks, Files and directories organization, File System Implementation
- 2.5. Distributed Systems: Distributed Message passing, RPC, Client/Server Computing, Clusters
- 2.6. Security : Authentication and Access Authorization, System Flaws and Attacks, Trusted system

**3. Computer Networks**

- 3.1 Protocol stack, OSI and TCP/IP models
- 3.2 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
- 3.3 Network Layer :services, datagram and virtual circuits, routing principles and algorithms, Internet Protocol (IP), IP addressing, IP transport, fragmentation and assembly, ICMP (Internet Control Message Protocol), routing on the internet, RIP (Routing Information Protocol), OSPF (Open Shortest Path First), router internals, IPv6
- 3.4 Transport Layer: principles, multiplexing and demultiplexing, UDP, TCP, flow control, principles of congestion control, TCP congestion control
- 3.5 Application Layer : Web and Web caching, FTP (File Transfer Protocol), Electronic mail, DNS (Domain Name Service), socket programming

**4. Structured and Object Oriented Programming**

- 4.1. Concept of Procedural Programming, Structural Programming, Object-Oriented Programming
- 4.2. Data types, Abstract Data Types (ADT)
- 4.3. Operators, variables and assignments
- 4.4. Control structures

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- 4.5. Procedure/function
- 4.6. Class definitions, encapsulation, inheritance, object composition, polymorphism
- 4.7. Concept of C programming, C++ Programming

**Section B**

<b>3 Questions × 10 Marks</b>	<b>30 Marks</b>
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**5. Database Management System**

- 5.1 The relational model, ER model
- 5.2 Structured Query Language (SQL)
- 5.3 Functional dependency, normalization and relational database design
- 5.4 Transaction Management and Concurrency Control: Concurrent execution of the user programs, transactions, Concurrency control techniques
- 5.5 Crash Recovery : types of failure, Recovery techniques
- 5.6 Query Processing and Optimization
- 5.7 Indexing : Hash based indexing, Tree based indexing
- 5.8 Distributed Database Systems and Object oriented database system
- 5.9 Data Mining and Data Warehousing
- 5.10 Database Security

**6. Software Engineering**

- 6.1 Software process: The software lifecycle models, risk-driven approaches
- 6.2 Software project management: Relationship to lifecycle, project planning, project control, project organization, risk management, cost models, configuration management, version control, quality assurance, metrics
- 6.3 Software requirements: Requirements analysis, requirements solicitation, analysis tools, requirements definition, requirements specification, static and dynamic specifications, requirements review, feasibility analysis
- 6.4 Software design: Design for reuse and with reuse, design for change, design notations, design evaluation and validation
- 6.5 Implementation: Programming standards and procedures, modularity, data abstraction, static analysis, unit testing, integration testing, regression testing, tools for testing, fault tolerance
- 6.6 Maintenance: The maintenance problem, the nature of maintenance, planning for maintenance
- 6.7 SE issues: Formal methods, tools and environments for software engineering, role of programming paradigm, process maturity and Improvement, ISO standards, SEI-CMM, CASE tools

**7. Data Structure and Algorithms**

- 7.1 General concepts : Abstract data Type, Time and space analysis of algorithms, Big oh and theta notations, Average, best and worst case analysis
- 7.2 Linear data structures
- 7.3 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
- 7.4 Algorithm design techniques: Greedy methods, Priority queue search, Exhaustive search, Divide and conquer, Dynamic programming, Recursion
- 7.5 Hashing
- 7.6 Graphs and digraphs
- 7.7 Sorting

### Section C

2 Questions × 5 Marks	20 Marks
1 Question × 10 Marks	

#### 8. Information System and Web Engineering

- 8.1 Information Systems and Decision Making; Knowledge Management.
- 8.2 Strategic use of Information Technology; Work Process Redesign (Reengineering) with Information Technology; Enterprise Resources Planning Systems
- 8.3 Information Systems Security, Information Privacy, and Global Information Technology issues
- 8.4 Web Technology: Internet, Intranet, WWW, Static and Dynamic Web Page; Web Clients; Web Servers; Client Server Architecture: Single Tier, Two-Tier, Multi-Tier; HTTP: HTTP Request and Response; URL, Client Side Scripting, Server Side Scripting, Web 2.0
- 8.5 Hyper Text Markup Language: Introduction to HTML; Elements of HTML Document; HTML Elements and HTML Attributes, Headings, Paragraph, Division, Formatting; Image element; Anchors; Lists; Tables; Frames; Forms
- 8.6 Client Side Scripting with JavaScript
- 8.7 Basics of AJAX; Introduction to XML and its application

#### 9. Artificial Intelligence

- 9.1 Search: Uninformed search techniques- depth first search, breadth first search, depth limit search, and search strategy comparison; Informed search techniques- hill climbing, best first search, greedy search
- 9.2 Learning: Supervised Learning; Unsupervised Learning; Semi-supervised Learning; Reinforcement Learning; Neural Networks; Support Vector Machine (SVM); Self Organizing Map (SOM); Genetic Algorithms; Clustering; Decision Trees.
- 9.3 Automated reasoning: FOPL; Knowledge Representation Languages. Basic Concepts of Natural Language Processing (NLP)
- 9.4 Game Playing

#### 10. Advanced Topics in IT

- 10.1 Parallel and distributed computing
- 10.2 High speed networks
- 10.3 Software Architecture
- 10.4 Cryptography and network security
- 10.5 E-commerce
- 10.6 Software Project Management
- 10.7 Cloud Computing
- 10.8 Big Data Analytics
- 10.9 Internet of Things (IoT)
- 10.10 Machine Learning

**Section D**

<b>2 Questions × 5 Marks</b>	<b>20 Marks</b>
<b>1 Question × 10 Marks</b>	

**11. Human Rights**

- 11.1 Introduction to Human Rights
- 11.2 National Human Rights Commission (NHRC) Act, 2068
- 11.3 National Human Rights Action Plan of Government of Nepal
- 11.4 Strategic Plan of NHRC
- 11.5 Financial Rules of NHRC
- 11.6 The Employee Service and Condition Rules of NHRC
- 11.7 Minorities Rights in Nepalese Context (Indigenous Group, Dalits, LGBTIQ+, Senior Citizen, Migrant Workers among Others)
- 11.8 Human Rights and Development Context (Social Inclusion for Disadvantaged Groups, Right to Development, Right to Live in Peace, Right to Environment, Human Rights Advocacy, Education and Training, Human Rights and Sustainable Human Development, Right Based Approach to Development)
- 11.9 Interrelations Between Duties and Rights
- 11.10 Universal Declaration of Human Rights, 1948
- 11.11 International Human Rights Treaties (International Covenant on Economic, Social and Cultural Rights 1966; International Covenant on Civil and Political Rights 1966; International Convention on the Elimination of all Forms of Racial Discrimination 1965; Convention on the Elimination of all Forms of Discrimination against Women 1979; Convention on the Rights of the Child 1989; Convention against Torture and other Cruel, Inhuman or Degrading Treatment or Punishment 1984; Convention on The Rights of Persons with Disabilities 2006; International Convention for the Protection of all Persons from Enforced Disappearance 2010; International Convention on the Protection of the Rights of all Migrant Workers and Members of Their Families 1990)
- 11.12 Human Rights Under UN System
- 11.13 Universal Periodic Review

**12. Drafting and Research Skills**

- 12.1 Media Techniques
- 12.2 Press Release
- 12.3 Speech
- 12.4 Research: Concept, Meaning, Types, Research Proposal, Research Methodology, Data Collection, Use of Statistical Tools and Analysis and Research Report

**Explanatory Notes:** Medium of examination would be either Nepali language or English language or both. One question bearing 10 marks from **Drafting and Research Skills** will be in English Language and answer to this question must be also in English Language

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सो सरह पदको खुला प्रतियोगितात्मक परीक्षाको पाठ्यक्रम  
प्रथम चरणको लिखित परीक्षाबाट छनौट भएका उम्मेदवारहरूलाई मात्र  
लिइने सामूहिक परीक्षण (Group Test) को लागि

### सामूहिक छलफल (Group Discussion)

यस प्रयोजनको लागि गरिने परीक्षण १० पूर्णाङ्क र ३० मिनेट अवधिको हुनेछ जुन नेता विहिन सामूहिक  
छलफल (Leaderless Group Discussion) को रूपमा अवलम्बन गरिने छ। दिइएको प्रश्न वा Topic का विषयमा  
पालैपालोसँग निर्दिष्ट समय भित्र समूह बीच छलफल गर्दै प्रत्येक उम्मेदवारले व्यक्तिगत प्रस्तुति (Individual  
Presentation) गर्नु पर्नेछ। यस परीक्षणमा मूल्याङ्कनको लागि देहाय अनुसारको ३ जनाको समिति रहनेछ।

आयोगका अध्यक्ष वा सदस्य	-	अध्यक्ष
मनोविज्ञ	-	सदस्य
दक्ष/विज्ञ (१ जना)	-	सदस्य

### सामूहिक छलफलमा दिइने नमूना प्रश्न वा Topic

उदाहरणको लागि - उर्जा संकट, गरीबी निवारण, स्वास्थ्य बीमा, खाद्य सुरक्षा, प्रतिभा पलायन जस्ता Topics मध्ये  
कुनै एक Topic मात्र दिइनेछ।