

लोक सेवा आयोग
संघीय संसद सेवा, सूचना प्रविधि समूह, राजपत्राङ्कित तृतीय श्रेणी, कम्प्युटर प्रोग्रामर पदको खुला
प्रतियोगितात्मक परीक्षाको पाठ्यक्रम

यस पाठ्यक्रम योजनालाई दुई चरणमा विभाजन गरिएको छ :

प्रथम चरण :-	लिखित परीक्षा (Written Examination)	पूर्णाङ्क :- २००
द्वितीय चरण :-	(क) सामूहिक परीक्षण (Group Test)	पूर्णाङ्क :- १०
	(ख) अन्तर्वार्ता (Interview)	पूर्णाङ्क :- ३०

परीक्षा योजना (Examination Scheme)

प्रथम चरण : लिखित परीक्षा (Written Examination)

पूर्णाङ्क :- २००

पत्र	विषय	खण्ड	पूर्णाङ्क	उत्तीर्णाङ्क	परीक्षा प्रणाली		प्रश्नसंख्या × अङ्क	समय
प्रथम	General Subject	Part I: General Awareness & General Reasoning Test	१००	४०	वस्तुगत (Objective)	बहुवैकल्पिक प्रश्न (MCQs)	५० प्रश्न × १ अङ्क	१ घण्टा ३० मिनेट
		Part II: General Technical Subject					५० प्रश्न × १ अङ्क	
द्वितीय	Technical Subject		१००	४०	विषयगत (Subjective)	छोटो उत्तर लामो उत्तर	४ प्रश्न × ५ अङ्क ८ प्रश्न × १० अङ्क	३ घण्टा

द्वितीय चरण : सामूहिक परीक्षण (Group Test) र अन्तर्वार्ता (Interview)

पूर्णाङ्क :- ४०

पत्र / विषय	पूर्णाङ्क	उत्तीर्णाङ्क	परीक्षा प्रणाली	समय
सामूहिक परीक्षण (Group Test)	१०		सामूहिक छलफल (Group Discussion)	३० मिनेट
अन्तर्वार्ता (Interview)	३०		बोर्ड अन्तर्वार्ता (Board Interview)	-

द्रष्टव्य :

- लिखित परीक्षाको माध्यम भाषा नेपाली वा अंग्रेजी अथवा नेपाली र अंग्रेजी दुवै हुनेछ।
- प्रथमपत्र र द्वितीयपत्रको लिखित परीक्षा छुट्टाछुट्टै हुनेछ।
- वस्तुगत बहुवैकल्पिक (Multiple Choice) प्रश्नहरूको गलत उत्तर दिएमा प्रत्येक गलत उत्तर बापत २० प्रतिशत अङ्क कट्टा गरिनेछ। तर उत्तर नदिएमा त्यस बापत अङ्क दिइने छैन र अङ्क कट्टा पनि गरिने छैन।
- बहुवैकल्पिक प्रश्नहरू हुने परीक्षामा कुनै प्रकारको क्याल्कुलेटर (Calculator) प्रयोग गर्न पाइने छैन।
- विषयगत प्रश्नहरूको हकमा तोकिएको अंकको एउटा लामो प्रश्न वा एउटै प्रश्नका दुई वा दुई भन्दा बढी भाग (Two or more parts of a single question) वा एउटा प्रश्न अन्तर्गत दुई वा बढी टिप्पणीहरू (Short notes) सोध्न सकिने छ।
- द्वितीय पत्रमा (विषयगत प्रश्न हुनेका हकमा) प्रत्येक खण्डका लागि छुट्टाछुट्टै उत्तरपुस्तिकाहरू हुनेछन्। परिक्षार्थीले प्रत्येक खण्डका प्रश्नहरूको उत्तर सोही खण्डको उत्तरपुस्तिकामा लेख्नुपर्नेछ।
- यस पाठ्यक्रम योजना अन्तर्गतका पत्र/विषयका विषयवस्तुमा जसुकै लेखिएको भए तापनि पाठ्यक्रममा परेका कानून, ऐन, नियम तथा नीतिहरू परीक्षाको मिति भन्दा ३ महिना अगाडि (संशोधन भएका वा संशोधन भई हटाईएका वा थप गरी संशोधन भई) कायम रहेकालाई यस पाठ्यक्रममा परेको सम्झनु पर्दछ।
- प्रथम चरणको परीक्षाबाट छनौट भएका उम्मेदवारहरूलाई मात्र द्वितीय चरणको परीक्षामा सम्मिलित गराइनेछ।
- यस भन्दा अगाडि लागू भएका माथि उल्लेखित सेवा, समूहको पाठ्यक्रम खारेज गरिएको छ।
- पाठ्यक्रम लागू मिति : - २०८०/०७/२०

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प्रथम पत्र (Paper I): General Subject

Part (I) : - General Awareness & General Ability Test (50 Marks)

1. **General Awareness and Contemporary Issues** (25 ×1 Mark = 25 Marks)
 - 1.1 Physical, socio-cultural and economic geography and demography of Nepal
 - 1.2 Major natural resources of Nepal
 - 1.3 Geographical diversity, climatic conditions, and livelihood & lifestyle of people
 - 1.4 Notable events and personalities, social, cultural and economic conditions in modern history of Nepal
 - 1.5 Current periodical plan of Nepal
 - 1.6 Information on sustainable development, environment, pollution, climate change, biodiversity, science and technology
 - 1.7 Nepal's international affairs and general information on the UNO, SAARC & BIMSTEC
 - 1.8 The Constitution of Nepal (From Part 1 to 5 and Schedules)
 - 1.9 Governance system and Government (Federal, Provincial and Local)
 - 1.10 Provisions of civil service act and regulation relating to constitution of civil service, organisational structure, posts of service, fulfillment of vacancy and code of conduct
 - 1.11 Functional scope of public services
 - 1.12 Public Service Charter
 - 1.13 Concept, objective and importance of public policy
 - 1.14 Fundamentals of management : planning, organizing, directing, controlling, coordinating, decision making, motivation and leadership
 - 1.15 Government planning, budgeting and accounting system
 - 1.16 Major events and current affairs of national and international importance
2. **General Reasoning Test** (25 ×1 Mark = 25 Marks)
 - 2.1 **Logical Reasoning** (9×1 Mark = 9 Marks)
Verbal Ability, Alphanumeric Series, Reasoning Analogies, Classification, Coding-Decoding, Order & Ranking, Distance & Directions, Analytical and Logical Reasoning, Assertion and Reason, Statement and Conclusion, Input-Output, Venn- diagram
 - 2.2 **Numerical Reasoning** (8×1 Mark = 8 Marks)
Arithmetic Series, Analogy, Classification, Arithmetical Reasoning, Fraction. Percentage, Ratio, Average, Profit & Loss, Time & Work, Date & Calender, Data Sufficiency, Data Interpretation & Data Verification
 - 2.3 **Spatial Reasoning** (8×1 Mark = 8 Marks)
Figure Series, Figure Analogy, Figure Classification, Figure Matrix, Pattern Completion, Embedded Images, Image Formation & Analysis, Mirror and Water Images, Cubes and Dices, Paper Folding & Cutting

Part (II) : - General Technical Subject (50 Marks)

1. Digital Design and Computer Architecture (5 Marks)

- 1.1. Digital Design
 - 1.1.1. Digital and Analog Systems
 - 1.1.2. Number Systems
 - 1.1.3. Logic Elements
 - 1.1.4. Combinational Logic Circuits
 - 1.1.5. Sequential Logic
 - 1.1.6. Arithmetic Circuits
 - 1.1.7. MSI Logic Circuits
 - 1.1.8. Counters and Registers
 - 1.1.9. IC logic families
 - 1.1.10. Interfacing with Analog Devices
 - 1.1.11. Memory Devices
- 1.2. Computer Architecture
 - 1.2.1. Basic Structures : sequential circuits, design procedure, state table and state diagram, Von Neumann / Harvard architecture, RISC/CISC architecture
 - 1.2.2. Addressing Methods and Programs, representation of data, arithmetic operations, basic operational concepts, bus structures, instruction cycle and excitation cycle
 - 1.2.3. Processing Unit: instruction formats, arithmetic and logical instruction
 - 1.2.4. Addressing modes
 - 1.2.5. Input Output Organization : I/O programming , memory mapped I/O, basic interrupt system, Direct Memory Access (DMA)
 - 1.2.6. Arithmetic Operations
 - 1.2.7. Memory Systems

2. Operating System (5 Marks)

- 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 (5 Marks)

- 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

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- 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 (5 Marks)

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

5. Database Management System (5 Marks)

- 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 (5 Marks)

- 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

7. Multimedia System ,MIS and Web Engineering (5 Marks)

- 7.1. Multimedia System
- 7.1.1. Introduction: Global structure of Multimedia; Medium; Multimedia System and properties
 - 7.1.2. Sound / Audio System: Concept of Sound System; Music and Speech; Speech Generation, Speech Analysis, Speech Transmission
 - 7.1.3. Images and Graphics: Digital Image representation; Image and Graphics Format; Image Synthesis, analysis and transmission
 - 7.1.4. Video and Animation: Video signal representation, computer video format; computer based animation
 - 7.1.5. Data Compression: Storage Space; Coding Requirements; Source, Entropy and Hybrid Coding; Lossy Sequential DCT- based Mode; Expanded Lossy DCT-based Mode; JPEG and MPEG
- 7.2. MIS and Web Engineering
- 7.2.1. Information Systems and Decision Making; Knowledge Management.
 - 7.2.2. The strategic use of Information Technology; Work Process Redesign (Reengineering) with Information Technology; Enterprise Resources Planning Systems
 - 7.2.3. Information Systems Security, Information Privacy, and Global Information Technology issues
 - 7.2.4. Introduction to 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
 - 7.2.5. 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
 - 7.2.6. Client Side Scripting with JavaScript
 - 7.2.7. Basics of AJAX; Introduction to XML and its Application

8. Theory of Computation, Data Structure and Algorithms (5 Marks)

- 8.1. Theory of Computation
- 8.1.1. DFA and NDFA, regular expressions, regular grammars
 - 8.1.2. CFGs, Parsing and ambiguity, Pushdown automata, NPDAs & CFGs
 - 8.1.3. Turing machines
 - 8.1.4. Recursively enumerable languages Unrestricted grammars
 - 8.1.5. The Chomsky hierarchy, Undecidable problems, Church's Thesis
 - 8.1.6. Complexity Theory, P and NP
- 8.2. Data Structure and Algorithms
- 8.2.1. General concepts : Abstract data Type, Time and space analysis of algorithms, Big oh and theta notations, Average, best and worst case analysis
 - 8.2.2. Linear data structures
 - 8.2.3. 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

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- 8.2.4. Algorithm design techniques: Greedy methods, Priority queue search, Exhaustive search, Divide and conquer, Dynamic programming, Recursion
- 8.2.5. Hashing
- 8.2.6. Graphs and digraphs
- 8.2.7. Sorting

9. Artificial Intelligence and Advanced Topics in IT (5 Marks)

- 9.1. Artificial Intelligence
 - 9.1.1. 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
 - 9.1.2. 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.
 - 9.1.3. Automated reasoning: FOPL; Knowledge Representation Languages. Basic Concepts of Natural Language Processing (NLP)
 - 9.1.4. Game Playing
- 9.2. Advanced Topics in IT
 - 9.2.1. Parallel and distributed computing
 - 9.2.2. High speed networks
 - 9.2.3. Software Architecture
 - 9.2.4. Cryptography and network security
 - 9.2.5. E-commerce
 - 9.2.6. Software Project Management
 - 9.2.7. Cloud Computing
 - 9.2.8. Big Data Analytics
 - 9.2.9. Internet of Things (IoT)
 - 9.2.10. Machine Learning

10. Related Legislation and Institutions (5 Marks)

- 10.1. सूचना तथा सञ्चार प्रविधि नीति, २०७२
- 10.2. विद्युतीय कारोवार ऐन, २०६३
- 10.3. सार्वजनिक खरिद ऐन, २०६३ र सार्वजनिक खरिद नियमावली, २०६४
- 10.4. आर्थिक कार्यविधि तथा वित्तिय उत्तरदायित्व ऐन, २०७६ र आर्थिक कार्यविधि तथा वित्तिय उत्तरदायित्व नियमावली, २०७७
- 10.5. संघीय संसद सचिवालय सम्बन्धी ऐन र नियमावलीहरु
- 10.6. सूचना तथा सञ्चार प्रविधि संग सम्बन्धित प्रमुख निकायका भूमिकाहरु: सञ्चार तथा सूचना प्रविधि मन्त्रालय, सूचना प्रविधि विभाग, नेपाल दूरसञ्चार प्राधिकरण, राष्ट्रिय सूचना प्रविधि केन्द्र (सरकारी एकिकृत डाटा सेन्टर)

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