

प्रदेश लोक सेवा आयोग, बागमती प्रदेश  
प्रशासन सेवा, विविध समुह, सातौं तह, कम्प्युटर इन्जिनियर 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	उर्तीर्णाङ्क	परीक्षा प्रणाली		प्रश्नसंख्या × अङ्क	समय
प्रथम	General Subject	Part I: General Awareness & General Ability 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	२ प्रश्न × ५ अङ्क ७ प्रश्न × १० अङ्क १ प्रश्न × २० अङ्क	३ घण्टा

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

पूर्णाङ्क :- ४०

पत्र / विषय	पूर्णाङ्क	उर्तीर्णाङ्क	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 क्यालकुलेटर (Calculator) लगायतका कुनै पनि विद्युतीय उपकरण 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 हुनेको हकमा) प्रत्येक खण्डका लागि छुट्टाछुट्टै उत्तरपुस्तिकाहरू हुनेछन् । परीक्षार्थीले प्रत्येक खण्डका प्रश्नहरूको उत्तर सोही खण्डको उत्तरपुस्तिकामा लेख्नुपर्नेछ ।
- यस पाठ्यक्रम योजना अन्तर्गतका पत्र/विषयका विषयवस्तुमा जेसुकै लेखिएको भए तापनि पाठ्यक्रममा परेका कानून, ऐन, नियम तथा नीतिहरू परीक्षाको मिति भन्दा ३ महिना अगाडि (संशोधन भएका वा संशोधन भइ हटाईएका वा थप गरी संशोधन भई) कायम रहेकालाई यस पाठ्यक्रममा परेको सम्झनु पर्दछ ।
- यथासम्भव प्रश्नहरू नेपाल र बागमती प्रदेशको सन्दर्भमा सोधिने छन् ।
- प्रथम चरणका परीक्षाबाट छनौट भएका उम्मेदवारहरूलाई मात्र द्वितीय चरणको परीक्षामा सम्मिलित गराइनेछ ।
- यस भन्दा अगाडि लागु भएका माथि उल्लेखित सेवा, समूहको पाठ्यक्रम खारेज गरिएको छ ।
- पाठ्यक्रम लागु मिति : - २०७९/८/११

**प्रथम पत्र (Paper I): General Subject**

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

- 1. नेपालको संविधान तथा सान्दर्भिक कानूनहरू: [10 ×1 Mark = 10 Marks]**
  - 1.1 नेपालको संविधान
  - 1.2 कर्मचारी समायोजन ऐन, २०७५
  - 1.3 सार्वजनिक खरिद ऐन, २०६३
  - 1.4 सार्वजनिक खरिद नियमावली, २०६४
  - 1.5 प्रदेश सार्वजनिक खरिद नियमावली, २०७६
  - 1.6 भ्रष्टाचार निवारण ऐन, २०६४
  - 1.7 सम्पत्ती शूद्धिकरण ऐन, २०६४
  - 1.8 प्रदेश सूचनाको हक सम्बन्धी ऐन, २०७६
  - 1.9 प्रदेश सुशासन ऐन, २०७७
  - 1.10 संघ, प्रदेश तथा स्थानीय तहका निजामती सेवा सम्बन्धी कानूनहरू
- 2. General Awareness and Contemporary Issues [20 ×1 Mark = 20 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 and Bagamati Province
  - 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 Governance system and Government (Federal, Provincial and Local)
  - 1.9 Functional scope of public services
  - 1.10 Public Service Charter
  - 1.11 Concept, objective and importance of public policy
  - 1.12 Fundamentals of management: planning, organizing, directing, controlling, coordinating, decision making, motivation and leadership
  - 1.13 Government planning, budgeting and accounting system
- 3. Major events and current affairs of national and international Importance [4 X 1 Mark = 4 Marks]**
- 4. General Ability Test [10×1 Mark = 10 Marks]**
  - 4.1 Verbal Ability Test**

Jumble words, Series, Analogy, Classification, Coding-Decoding, Matrix, Ranking Order Test, Direction and Distance Sense Test, Common Sense Test, Logical Reasoning, Assertion and Reason, Statement and Conclusions
  - 4.2 Numerical Ability Test**

Series, Analogy, Classification, Coding, Arithmetical reasoning/ operation,

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Percentage, Ratio, Average, Loss & Profit, Time & Work, Data interpretation &  
Data verification

**4.3 Non-verbal/Abstract Ability Test**

Figure Series, Figure Analogy, Figure Classification, Figure Matrix, Pattern  
Completion/Finding, Analytical Reasoning Test, Figure Formation and Analysis,  
Rule Detection, Water images, Mirror images, Cubes and Dice & Venn-diagram

**5. नेपाली र अङ्ग्रेजी भाषा:**

**[6 X 1 Mark = 6 Marks]**

**5.1 English: Knowledge on writing correct English sentences, letters, and reports according to  
English grammar based on the following syntactic functions: [3 X 1 Mark = 3 Marks]**

- a. Parts of Speech:
- b. Noun
- c. Pronoun
- d. Adjective
- e. Determiner
- f. Verb
- g. Adverb
- h. Preposition
- i. Conjunction and
- j. Interjection
- k. Infinitives and gerunds, reported speech and tenses

**5.2 नेपाली: नेपाली भाषामा स्तरीय शुद्ध शब्द, वाक्यांश र वाक्य लेखनको लागि आवश्यक पर्ने ह्रस्व दीर्घ, ब र व,  
तथा श, ष, स लगायतका व्याकरणगत शुद्ध लेखनशैलीमा केन्द्रित शुद्ध शब्द, वाक्यांश र वाक्य लेखनसहितको  
नेपाली भाषाको शुद्धशुद्धिको ज्ञान [3 X 1 Mark = 3 Marks]**

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

**Section A- 17 marks**

1. **Computer Networks**
  - 1.1 Protocol stack, switching
  - 1.2 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
  - 1.3 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)
  - 1.4 Transport Layer: principles, multiplexing and demultiplexing, UDP, TCP, flow control, principles of congestion control, TCP congestion control
  - 1.5 Application Layer : Web and Web caching, FTP (File Transfer Protocol), Electronic mail, DNS (Domain Name Service), socket programming)
  - 1.6 Distributed system, Clusters
2. **Computer Architecture & organization and micro-processors**
  - 2.1 Basic Structures : sequential circuits, design procedure, state table and state diagram, von Neumann / Harvard architecture, RISC/CISC architecture
  - 2.2 Addressing Methods and Programs, representation of data, arithmetic operations, basic operational concepts, bus structures, instruction, cycle and excitation cycle.
  - 2.3 Processing Unit: instruction formats, arithmetic and logical instruction.
  - 2.4 addressing modes
  - 2.5 Input Output Organization : I/O programming , memory mapped I/O, basic interrupt system, DMA
  - 2.6 Arithmetic
  - 2.7 Memory Systems
  - 2.8 808X and Intel microprocessors: programming and interfacing
3. **Digital Design**
  - 3.1 Digital and Analog Systems. Number Systems.
  - 3.2 Logic Elements
  - 3.3 Combinational Logic Circuits
  - 3.4 Sequential Logic
  - 3.5 Arithmetic Circuits
  - 3.6 MSI Logic circuits
  - 3.7 Counters and Registers
  - 3.8 IC logic families
  - 3.9 Interfacing with Analog Devices
  - 3.10 Memory Devices
4. **Basic Electrical & Electronics**
  - 4.1 **Electrical**
    - 4.1.1 Basic Circuit Theory
    - 4.1.2 AC circuit Fundamentals

- 4.1.3 Magnetic circuits and Transformers
- 4.1.4 Transient Analysis, Filters
- 4.2 **Electronics**
  - 4.2.1 Semiconductors, Diodes and Diode Circuits, Transistors,
  - 4.2.2 Transistor modeling
  - 4.2.3 Biasing and Amplification
  - 4.2.4 Small Signal amplifiers and frequency response
  - 4.2.5 Large signal amplifiers, feedback amplifiers and Oscillators
  - 4.2.6 Operational amplifiers
- 5. **Principles of Electronic Communications**
  - 5.1 Block Diagram of analog/ digital communication system
  - 5.2 Analog and Digital modulation techniques
  - 5.3 Fundamentals of Error Detection and Correction
  - 5.4 Performance evaluation of analog and digital communication systems: SNR and BER

### Section B- 18 marks

- 6. **Structured and object oriented programming**
  - 6.1 Data types, ADT
  - 6.2 Operators, variables and assignments, control structures
  - 6.3 Procedure/function
  - 6.4 Class definitions, encapsulation, inheritance, object composition, polymorphism
  - 6.5 Pattern and framework
- 7. **Data structures**
  - 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
- 8. **Software Engineering principles (System analysis & design)**
  - 8.1 Software process: The software lifecycle models, risk-driven approaches
  - 8.2 Software Project management: Relationship to lifecycle, project planning, project control, project organization, risk management, cost models, configuration management, version control, quality assurance, metrics
  - 8.3 Software requirements: Requirements analysis, requirements solicitation, analysis tools, requirements definition, requirements specification, static and dynamic specifications, requirements review.
  - 8.4 Software design: Design for reuse, design for change, design notations, design evaluation and validation

- 8.5 Implementation: Programming standards and procedures, modularity, data abstraction, static analysis, unit testing, integration testing, regression testing, tools for testing, fault tolerance
- 8.6 Maintenance: The maintenance problem, the nature of maintenance, planning for maintenance
- 8.7 SE issues: Formal methods, tools and environments for software engineering, role of programming paradigm, process maturity and Improvement, ISO standards, SEI-CMM, CASE tools
- 9. **Database Management System**
  - 9.1 Introduction : The relational model, ER model , SQL, Functional dependency and relational database design, File structure
  - 9.2 Transaction Management and Concurrency Control: Concurrent execution of the user programs, transactions, Concurrency control techniques
  - 9.3 Crash Recovery : types of failure, Recovery techniques
  - 9.4 Query Processing and Optimization
  - 9.5 Indexing : Hash based indexing, Tree based indexing
  - 9.6 Distributed Database Systems and Object oriented database system
  - 9.7 Data Mining and Data Warehousing
  - 9.8 Security Management System
- 10. **Operating System**
  - 10.1 Processes and Threads: Symmetric Multiprocessing, Micro-kernels, Concurrency, Mutual Exclusion and Synchronization, Deadlock
  - 10.2 Scheduling
  - 10.3 Memory Management
  - 10.4 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
  - 10.5 Distributed Systems: Distributed Message passing, RPC, Client/Server Computing, Clusters
  - 10.6 Security : Authentication and Access Authorization, System Flaws and Attacks, Trusted system

### Section C- 15 marks

- 11. **Artificial Intelligence**
  - 11.1 Search
  - 11.2 Natural Language Processing
  - 11.3 Game Playing
  - 11.4 Learning
  - 11.5 Automated reasoning
  - 11.6 Planning
  - 11.7 Vision and Robotics
- 12. **Theory of Computation**
  - 12.1 BNF, Languages, grammars
  - 12.2 DFA and NDFA, regular expressions, regular grammars
  - 12.3 Closure, homomorphism
  - 12.4 Pigeonhole principle, pumping lemma
  - 12.5 CFGs, Parsing and ambiguity, Pushdown automata, NPDAs & CFGs
  - 12.6 Pumping lemma
  - 12.7 Turing machines

- 12.8 Recursively enumerable languages Unrestricted grammars
- 12.9 The Chomsky hierarchy, Undecidable problems, Church's Thesis
- 12.10 Complexity Theory, P and NP
- 13. **Compiler design**
  - 13.1 The Structure of a Compiler
  - 13.2 Lexical Analyzer
  - 13.3 Top down Parsing/ Bottom up Parsing
  - 13.4 Syntax Directed Translation
  - 13.5 Types and Type Checking
  - 13.6 Run-Time Storage Administration
  - 13.7 Intermediate Code generation
  - 13.8 Data-Flow Analysis and Code Optimizations
  - 13.9 Architecture and recent development on compilers
- 14. **Computer Graphics**
  - 14.1 Graphics concepts
  - 14.2 Input devices and techniques
  - 14.3 Basic raster graphics algorithms and primitives
  - 14.4 Scan conversion
  - 14.5 Graphics hardware
  - 14.6 2D geometrical transformations and viewing
  - 14.7 3D geometry and viewing
  - 14.8 Hierarchical modeling
  - 14.9 Projections
  - 14.10 Hidden surface removal
  - 14.11 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

द्वितीय पत्र (**Paper II**) : **Technical Subject**

**Section A- 25 Marks**

1. **Computer Networks**
  - 1.1 Protocol stack, switching
  - 1.2 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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  - 1.6 Distributed system, Clusters
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  - 2.3 Processing Unit: instruction formats, arithmetic and logical instruction.
  - 2.4 addressing modes
  - 2.5 Input Output Organization : I/O programming , memory mapped I/O, basic interrupt system, DMA
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**Section B- 25 Marks**

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- 7.5 Hashing
- 7.6 Graphs and digraphs
- 7.7 Sorting

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- 10.5 Distributed Systems: Distributed Message passing, RPC, Client/Server Computing, Clusters
- 10.6 Security : Authentication and Access Authorization, System Flaws and Attacks, Trusted system

**Section C- 20 Marks**

11. **Artificial Intelligence**

- 11.1 Search
- 11.2 Natural Language Processing
- 11.3 Game Playing
- 11.4 Learning
- 11.5 Automated reasoning
- 11.6 Planning
- 11.7 Vision and Robotics

12. **Theory of Computation**

- 12.1 BNF, Languages, grammars
- 12.2 DFA and NDFAs, regular expressions, regular grammars
- 12.3 Closure, homomorphism
- 12.4 Pigeonhole principle, pumping lemma
- 12.5 CFGs, Parsing and ambiguity, Pushdown automata, NPDAs & CFGs
- 12.6 Pumping lemma
- 12.7 Turing machines
- 12.8 Recursively enumerable languages Unrestricted grammars
- 12.9 The Chomsky hierarchy, Undecidable problems, Church's Thesis
- 12.10 Complexity Theory, P and NP

13. **Compiler design**

- 13.1 The Structure of a Compiler
- 13.2 Lexical Analyzer
- 13.3 Top down Parsing/ Bottom up Parsing
- 13.4 Syntax Directed Translation
- 13.5 Types and Type Checking
- 13.6 Run-Time Storage Administration

- 13.7 Intermediate Code generation
- 13.8 Data-Flow Analysis and Code Optimizations
- 13.9 Architecture and recent development on compilers
- 14. **Computer Graphics**
  - 14.1 Graphics concepts
  - 14.2 Input devices and techniques
  - 14.3 Basic raster graphics algorithms and primitives
  - 14.4 Scan conversion
  - 14.5 Graphics hardware
  - 14.6 2D geometrical transformations and viewing
  - 14.7 3D geometry and viewing
  - 14.8 Hierarchical modeling
  - 14.9 Projections
  - 14.10 Hidden surface removal
  - 14.11 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 Marks**

- 16. This section consists of 2 (two) sub-sections i.e. Technical Writing and Case study.
  - 16.1 **Technical Writing (1 question Carrying 10 marks)**

This section may ask the examinee to write technical proposal on given specification, essay, views/critics etc. The topic must be related to computer technology or the matter related therewith and examinee should be encouraged to put his/her own views and reasoning rather than facts/information.
  - 16.2 **Case Study (1 question Carrying 20 marks)**

This section is dedicated to the analysis and design of a software system. Examinee should be given a scenario of existing system and asked to analyze and design it following one particular paradigm. This section should include the various domain of knowledge in one platform (for e.g. A case study may incorporate questions from Software Engineering and Database management and Operating system domains).

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प्रथम चरणको लिखित परीक्षाबाट छनौट भएका उम्मेदवारहरूलाई मात्र लिइने  
सामूहिक परीक्षण (**Group Test**) का लागि

**सामूहिक छलफल (Group Discussion)**

यस प्रयोजनका 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 मूल्याङ्कनका लागि देहाय अनुसारका ३ जना भन्दा बढीको समिति रहनेछ।

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

**सामूहिक छलफलमा दिइने नमूना प्रश्न वा Topic**

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