लोक सेवा आयोग
नेपाल विभाग सेवा, जातिप्रभात तुलिय शेरी, कम्प्युटर इलेक्ट्रनिक य पदको खुला प्रतियोगितात्मक परीक्षाको पाठ्यक्रम

यस पाठ्यक्रम योजनालाई दुई चरणमा विभाजन गरिएको छ:

प्रथम चरण :- लिखित परीक्षा (Written Examination) पूर्णाङ्क :- 200

द्वितीय चरण :- (क) सामान्यिक परीक्षा (Group Test) पूर्णाङ्क :- 10
(ख) अन्तर्वित्त (Interview) पूर्णाङ्क :- 30

परीक्षा योजना (Examination Scheme)

<table>
<thead>
<tr>
<th>पत्र</th>
<th>विषय</th>
<th>खण्ड</th>
<th>पूर्णाङ्क</th>
<th>उत्तराङ्क</th>
<th>परीक्षा प्रशासन</th>
<th>प्रथमसंख्या ×अंश</th>
<th>समय</th>
</tr>
</thead>
<tbody>
<tr>
<td>प्रथम</td>
<td>General Subject</td>
<td>Part I: General Awareness &amp; General Ability Test</td>
<td>100</td>
<td>40</td>
<td>भस्तुगत (Objective)</td>
<td>50 प्रश्न × 1 अंश</td>
<td>1 घण्टा 30 मिनटे</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Part II: General Technical Subject</td>
<td></td>
<td></td>
<td>वहूबैक्ष्यिक प्रश्न (MCQs)</td>
<td>50 प्रश्न × 1 अंश</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Technical Subject</td>
<td></td>
<td>100</td>
<td>40</td>
<td>विषयमान (Subjective)</td>
<td>2 प्रश्न × 5 अंश</td>
<td>3 घण्टा</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>पत्र /विषय</th>
<th>पूर्णाङ्क</th>
<th>उत्तराङ्क</th>
<th>परीक्षा प्रशासन</th>
<th>समय</th>
</tr>
</thead>
<tbody>
<tr>
<td>सामान्यिक परीक्षा (Group Test)</td>
<td>10</td>
<td>सामान्यिक छलफल (Group Discussion)</td>
<td>30 मिनटे</td>
<td></td>
</tr>
<tr>
<td>अन्तर्वित्त (Interview)</td>
<td>30</td>
<td>बोर्ड अन्तर्वित्त (Board Interview)</td>
<td>-</td>
<td></td>
</tr>
</tbody>
</table>

प्रश्निको विवरण:

1. लिखित परीक्षा को माध्यम भाषा नेपाली बा अंग्रेजी अथवा नेपाली र अंग्रेजी दुई भाषामा हुनैछ।
2. प्रथमसंख्या र द्वितीय पत्रको लिखित परीक्षा छाँटै रुटेको छ।
3. भस्तुगत वहूबैक्ष्यिक (Multiple Choice) प्रश्नहरूको गल्त उत्तर दिइएमा प्रश्नक गल्त उत्तर वापस 20 प्रश्नवारी अधिक गरिएको छ। तर उत्तर नैदिक तास गल्त बाँट र अधिक गल्त र सीख्ने गरिएको छ।
4. वहूबैक्ष्यिक प्रश्नहरू हुने परीक्षामा कूनै प्रश्नहरूको क्याल्कुलेटर (Calculator) प्रश्न हुँदै रहेको छ।
5. विषयमान प्रश्नहरूको हकमा तीनको एउटा लामो प्रश्न र एउटा प्रश्नको दुई वा दुई भन्दा बढी भाग (Two or more parts of a single question) र एउटा प्रश्न अन्तर्गत दुई र बढी दियोगहरू (Short notes) सिङ्गही सुझाइएका छ।
6. द्वितीय पत्रमा (विषयमान प्रश्न हुँदै हकमा) प्रश्नक खण्डको लागि छाँटौटै उत्तरपुस्तिकाहरू हुनेछ।
7. परीक्षालाई विषयमान प्रश्नहरूको हकमा प्रश्नको उत्तर सीखिएको उत्तरपुस्तिकामा लेखेको छ।
8. यस पाठ्यक्रम योजनालाई दुई चरणमा पत्र/विषयको विषयसङ्गम वेतनस्तुतिका तथा नीतिका भएको भएको परीक्षालाई काठानुसार, ऐस नियम तथा नीतिहरू परीक्षाको भएको भएको परीक्षाको मिति भन्दा ३ महिना अगाड (संशोधन भएको र संशोधन भएको हटाइएको र अघ गरी संशोधन भएको) कायम रूपमा लागाइएको यस पाठ्यक्रम परीक्षा सम्भव र पद्धत कार्य गरिएको छ।
9. प्राथमिक परीक्षालाई छाँटौटैभएका 'उपन्यास' परीक्षाको परीक्षाफलमा सम्मिलित गराउने छ।
10. पाठ्यक्रम लागौ मिति : २०७६/०६/२५
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 Ability Test** (25 × 1 Mark = 25 Marks)
   2.1 **Verbal Ability Test** (8 × 1 Mark = 8 Marks)
       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

   2.2 **Numerical Ability Test** (9 × 1 Mark = 9 Marks)
       Series, Analogy, Classification, Coding, Arithmetical reasoning/operation, Percentage, Ratio, Average, Loss & Profit, Time & Work, Data interpretation & Data verification

   2.3 **Non-verbal/Abstract Ability Test** (8 × 1 Mark = 8 Marks)
       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
Part (II) - General Technical Subject (50 Marks)

Section A - 34%

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
   3.2 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- 36 %**

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- 30 %

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 N DFA, 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
Recursively enumerable languages  unrestricted grammars
The Chomsky hierarchy, Undecidable problems, Church's Thesis
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

14.1 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