ललितपुर महानगरपालिका

अधिकृत छैटौं तह, सूचना प्रविधि अधिकृत पदको खुला प्रतियोगितात्मक परीक्षाको पाठ्यक्रम

यस पाठ्यक्रमलाई दुई चरणमा विभाजन गरिएको छः

परीक्षा योजना (Examination Scheme)

प्रथम चरणः लिखित परीक्षा (Written Examination):

Paper	Subject	Part	Full Marks	Pass Marks	Exam Type		No. of Questions x Marks	Time
I[st]	**General Subject**	Part I: General Awareness & General Reasoning Test	100	40	Objective	Multiple Choice Questions (MCQ)	20 Qns. x 1 marks	1 Hour and 30 Minutes
		Part II: General Technical Subject					80 Qns. x 1 marks	

द्वितीय चरणः अन्तर्वार्ता (Interview):

Paper/Subject	Full Marks	Pass Marks	Exam Type	Time
Interview	20		Board Interview	-

द्रष्टव्यः

१. प्रथम चरणको प्रश्नपत्रको भाषा नेपाली वा अंग्रेजी वा नेपाली र अंग्रेजी दुवै हुनेछ।

२. वस्तुगत बहुवैकल्पिक ((Multiple Choice) प्रश्नको 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।

३. वस्तुगत बहुवैकल्पिक (Multiple Choice) हुने परीक्षामा परीक्षार्थीले उत्तर लेख्दा अंग्रेजी ठूलो अक्षरहरु (Capital Letters): A, B, C, D मा लेख्नुपर्नेछ। सानो अक्षरहरू (Small Letters): a, b, c, d लेखेको वा अन्य कुनै सङ्केत गरेको वा केरमेट गरेको भए सो उत्तरलाई गलत मानिनेछ।

४. उत्तरपुस्तिकामा प्रश्नपत्रमा उल्लेखित 'कि' स्पष्टसँग उल्लेख गर्नु पर्नेछ। 'कि' उल्लेख नगरेको वा उत्तरपुस्तिकामा कुनै संकेत गरेको पाइएमा उत्तरपुस्तिका रद्ध हुनेछ।

५. बहुवैकल्पिक प्रश्न हुने परीक्षामा कुनै प्रकारको क्याल्कुलेटर प्रयोग गर्न पाइने छैन।

६. परीक्षामा सोधिने प्रश्नहरु यथासम्भव सम्बन्धित पाठ्यक्रममा विभाजन गरेको अङ्कको आधारमा सोधिनेछ।

७. 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।

८. प्रथम चरणको परीक्षाबाट छनोट भएका उम्मेदवारलाई मात्र द्वितीय चरणको अन्तर्वार्तामा सम्मिलित गराइनेछ।

९. प्रथम चरणको लिखित परीक्षा र द्वितीय चरणको अन्तर्वार्ता तथा स्थानीय र अनुभवको अंकको योग समेतका आधारमा योग्यताक्रमको सूचीमा समावेश गरी अन्तिम परीक्षाफल प्रकाशन गरिनेछ।

१०. पाठ्यक्रम लागु मितिः २०८१/०८/१९.

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Part I : <u>General Awareness & General Ability Test (20 Marks)</u>

1. **General Awareness and Contemporary Issues**: (10 x 1 Mark= 10 Marks)
   - 1.1. Physical, socio-cultural, and economic geography and demography of Nepal.
   - 1.2. Major natural resources of Nepal.
   - 1.3. Current periodical plan of Nepal.
   - 1.4. Information on sustainable development, environment, pollution, climate change, biodiversity, science and technology.
   - 1.5. Governance system and Government (Federal, Provincial, and Local)
   - 1.6. Concept, objective, and importance of public policy.
   - 1.7. Government planning, budgeting, and accounting system.
   - 1.8. Major events and current affairs of national and international importance.
   - 1.9. Public Service Charter.
   - 1.10. नेपालको संविधानको भाग १, २, ३, ४, ५, १७, १८, १९ र २० तथा अनुसूचीहरु।
   - 1.11. स्थानीय सरकार सञ्चालन ऐन, २०७४।
   - 1.12. ललितपुर महानगरपालिका वारे सामान्य जानकारी।

2. **General Reasoning Test** **(10 x 1 Mark= 10 Marks)**
   - **2.1 Logical Reasoning:** 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**: Arithmetic Series, Analogy, Classification, Arithmetical Reasoning, Fraction. Percentage, Ratio, Average, Profit & Loss, Time & Work, Date & Calendar, Data Sufficiency, Data Interpretation & Data Verification.
   - 2.3 **Spatial Reasoning**: 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.

ललितपुर महानगरपालिका

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Part II : General Technical Subject (80 Marks)

1. Computer Architecture: (8X1 Marks= 8 Marks)

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 (8X1 Marks= 8 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 (8X1 Marks= 8 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

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

4. Structured and Object Oriented Programming: (8X1 Marks= 8 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

5. Database Management System (8X1 Marks= 8 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 (8X1 Marks= 8 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 Improvement, ISO standards, SEI-CMM, CASE tools

7. Data Structure and Algorithms: (8X1 Marks= 8 Marks)

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 diagraphs

7.7 Sorting

8. Information System and Web Engineering: (8X1 Marks= 8 Marks)

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: (8X1 Marks= 8 Marks)

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 (5X1 Marks= 5 Marks)

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.

11. Related Legislation and Institution: (3X1 Marks= 3 Marks)

11.1 सूचना तथा सञ्चार प्रविधि नीति,२०७२

11.2 विद्युतीय कारोवार ऐन, २०६३

11.3 राष्ट्रिय साइवर सुरक्षा नीति, २०८०

11.4 सार्वजनिक खरिद ऐन, २०६३ र सार्वजनिक खरिद नियमावली, २०६४

11.5 सूचना तथा सञ्चार प्रविधि संग सम्बन्धित प्रमुख निकायका भूमिकाहरूः सञ्चार तथा सूचना प्रविधि मन्त्रालय, सूचना प्रविधि विभाग, नेपाल दूरसञ्चार प्राधिकरण, राष्ट्रिय सूचना प्रविधि केन्द्र (सरकारी एकिकृत डाटा सेन्टर)