नेपाल विद्युत प्राधिकरण

प्राविधिक सेवा, सवै समूह/उपसमूह, तह ७, विभिन्न पदको लागि खुला प्रतियोगितात्मक परीक्षाको पाठ्यक्रम

पाठ्यक्रम योजनालाई निम्नानुसारका दुई चरणमा विभाजन गरिएको छ ।

प्रथम चरण: लिखित परीक्षा पूर्णाङ्क :- २००

द्वितीय चरण: अन्तर्वार्ता पूर्णाङ्क :- ३०

१. **प्रथम चरण: लिखित परीक्षा (Written Examination) पूर्णाङ्क** :- २००

पत्र	विषय	पूर्णाङ्क	उत्तीर्णाङ्क	खण्ड	परीक्षा प्रणाली		प्रश्नसख्या ×अङ्क	समय
प्रथम	सामान्य ज्ञान र बौद्धिक ज्ञान	१००	४०	(क)	वस्तुगत	बहुवैकल्पिक प्रश्न (MCQ)	५० प्रश्न *१ अङ्क	४५ मिनेट
	संस्थागत एवं सामाजिक मामिला			(ख)	विषयगत	छोटो उत्तर आउने प्रश्न	६ प्रश्न * ५ अङ्क	१ घण्टा ३० मिनेट
						लामो उत्तर आउने प्रश्न	२ प्रश्न *१० अङ्क	
द्वितिय	सेवा सम्बन्धी विस्तृत ज्ञान	१००	४०	(क)	विषयगत	छोटो उत्तर आउने प्रश्न	२ प्रश्न * ५ अङ्क	३ घण्टा
						लामो उत्तर आउने प्रश्न	४ प्रश्न * १० अङ्क	
				(ख)		छोटो उत्तर आउने प्रश्न	२ प्रश्न * ५ अङ्क	
						लामो उत्तर आउने प्रश्न	४ प्रश्न *१० अङ्क	

२. द्वितीय चरण: अन्तर्वार्ता (Interview) पूर्णाङ्क :- ३०

विषय	पूर्णाङ्क	परीक्षा प्रणाली
अन्तर्वार्ता	३०	मौखिक

द्रष्टव्य :

१. लिखित परीक्षाको माध्यम भाषा नेपाली वा अग्रेजी अथवा नेपाली र अग्रेजी दुवै हुन सक्नेछ ।

२. प्रथम र द्धितीय पत्रको लिखित परीक्षा छुट्टाछुट्टै हुनेछ ।

३. लिखित परीक्षामा सोधिने प्रश्न संख्या र अङ्कभार यथासम्भव सम्बन्धित पत्र / विषयमा दिईए अनुसार हुनेछ ।

४. वस्तुगत बहुवैकल्पिक (Multiple Choice) प्रश्नहरुको गलत उत्तर दिएमा प्रत्येक गलत उत्तर वापत २० प्रतिशत अङ्क कट्टा गरिनेछ। तर उत्तर नदिएमा त्यस बापत अङ्क दिइने छैन र अङ्क कट्टा पनि गरिने छैन ।

५. वस्तुगत बहुवैकल्पिक हुने परीक्षामा परीक्षार्थीले उत्तर लेख्दा अग्रेजी ठूलो अक्षर (Capital Letter) A,B,C,D मा लेख्नुपर्नेछ । सानो अक्षर (Small Letter) a,b,c,d लेखेको वा अन्य कुनै सङ्केत गरेको भए सबै उत्तरपुस्तिका रद्ध हुनेछ ।

६. बहुवैकल्पिक प्रश्नहरु हुने परीक्षामा कुनै प्रकारको क्यालकुलेटर (Calculator) प्रयोग गर्न पाइने छैन ।

७. विषयगत प्रश्नहरुको हकमा 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 टिप्पणीहरु (Short notes) सोध्न सकिनेछ।

८. विषयगत प्रश्न हुने पत्र/विषयका प्रत्येक खण्डका प्रश्नका लागि छुट्टाछुट्टै उत्तरपुस्तिकाहरु हुनेछन। परीक्षार्थीले प्रत्येक खण्डका प्रश्नको उत्तर सोही खण्डको उत्तरपुस्तिकामा लेख्नुपर्नेछ ।

९. यस पाठ्यक्रम योजना अन्तर्गतका पत्र/ विषय विषयवस्तुमा जुनसुकै कुरा लेखिएको भए तापनि पाठ्यक्रममा परेका कानून, ऐन, नियम, विनियम तथा नीतिहरु परीक्षाको मिति भन्दा ३ महिना अगाडी (संशोधन भएका वा संशोधन भई हटाईएका वा थप गरी संशोधन भई) कायम रहेकालाई यस पाठ्यक्रममा परेको सम्झनु पर्दछ ।

१०. प्रथम चरणको परीक्षाबाट छनौट भएका उम्मेदवारहरुलाई मात्र द्वितीय चरणको परीक्षामा सम्मिलित गराइनेछ ।

११. पाठ्यक्रम स्वीकृत मिति :- २०८०/०८/२१

नेपाल विद्युत प्राधिकरण

प्राविधिक सेवा, सवै समूह/उपसमूह, तह ७, विभिन्न पदको लागि खुला प्रतियोगितात्मक परीक्षाको पाठ्यक्रम

प्रथम पत्र

खण्ड (क) सामान्य ज्ञान र बौद्धिक परीक्षणः ५० अङ्क

1. सामान्य ज्ञानः (३०x १ = ३० अङ्क)

1.1 नेपालको भूगोल र आर्थिक तथा सामाजिक क्रियाकलापः धरातलीय स्वरुपको किसिम र विशेषता, नेपालमा पाईने हावापानीको किसिम र विशेषता, नदीनाला, तालतलैया, खनिज पदार्थ, प्राकृतिक स्रोत साधन, विद्युत, शिक्षा, स्वास्थ्य र सञ्चारसम्बन्धी जानकारी

1.2 नेपालको सामाजिक एवं सांस्कृतिक अवस्थाः प्रथा, परम्परा धर्म, जातजाति, भाषाभाषी, कला, संस्कृति र साहित्य

1.3 नेपालमा विद्युत विकास, उर्जाका स्रोत र सम्भावना

1.4 नेपालको संघीय, प्रादेशिक र स्थानीय संरचना तथा शासन प्रणाली सम्बन्धी जानकारी

1.5 विश्वको भूगोलः महादेश, महासागर, अक्षांश, देशान्तर, अन्तर्राष्ट्रिय तिथि रेखा, समय, पर्वतश्रृङ्खला, नदी, हिमनदी, ताल, हिमताल

1.6 अन्तर्राष्ट्रिय सम्बन्ध तथा संघ/ संस्थाः संयुक्त राष्ट्र संघ र यसका एजेन्सीहरु (UNO and Its Agencies) दक्षिण एशियाली क्षेत्रीय सहयोग संगठन (SAARC) सम्बन्धी जानकारी

1.7 राष्ट्रिय तथा अन्तर्राष्ट्रिय महत्वका समसामयिक घटना तथा नविनतम गतिविधिहरु

2. बौद्धिक परीक्षणः (२०x १ = २० अङ्क)

2.1 Verbal and Non-verbal Aptitude:

Vocabulary, Alphabetical ordering of words, Classification, Coding-Decoding, Insert the missing character, Direction and Distance sense test, Ranking order test, Relationship Test, Logical sequence of words, Common sense test, Assertion and Reason, Logical reasoning, Figure series, Figure analogy, Figure Classification, Figure Matrix, Pattern completion/finding, Construction of squares and triangles, Analytical reasoning.

2.2 Numerical Ability and Quantitative Aptitude

Arithmetical reasoning, Insert the correct mathematical signs, Decimal and Fraction, Percentage, Ratio, Average, Profit and Loss, Time and work.

खण्ड (ख) संस्थागत एवं सामाजिक मामिलाः ५० अङ्क

1. Constitution, Act and Rules

1.1. Constitution of Nepal
1.2. Nepal Electricity Authority Act, 2041
1.3. Electricity Regulatory Commission Act, 2074
1.4. Electricity Act, 2049 and Electricity Regulation, 2050
1.5. Public Procurement Act, 2063 and Regulations, 2064
1.6. Nepal Electricity Authority, Present Financial Administration bylaws
1.7. Nepal Electricity Authority, Present Employee Service bylaws
1.8. Corruption Control Act, 2059
1.9. Good Governance (Management and Operation) Act, 2064
1.10. Land Acquisition Act, 2034
1.11. Environment Protection Act, 2076 and Environment Protection Regulation, 2077

2. Electricity Development in Nepal

2.1 History of power development in Nepal; Energy supply demand trends
2.2 Recent trends in power sector reform; Hydropower potential of Nepal and prospects and challenges for its development
2.3 Nepal Electricity Authority: objective, functions, corporate structure, achievement and challenges
2.4 Concept of NEA Restructuring in federal context
2.5 Reliable and Equality Electricity Services in Administration Development (Nepal: Prospects and Challenges)

3. Development

3.1 General concept of development administration
3.2 Planning in Nepal: efforts, achievement and challenges
3.3 Sustainable Development
3.4 Public Private Partnership
3.5 General Concept of Public Administration and its Function

4. Management and Financial Analysis

4.1 Concept of Management
4.2 Motivation, Leadership, Control, Coordination and Team work, Decision making
4.3 Corporate planning and strategic management
4.4 Corporate social responsibility
4.5 Project management: Use of network models- CPM, PERT, human resource planning and resource scheduling; project monitoring and control; project control cycle
4.6 Financial analysis: Methods of financial analysis such as benefit cost ratio, internal rate of return (EIRR and FIRR), net present value, payback period, minimum attractive rate of return and their application; tariff structure

5. New Trends of Power Sector

5.1 Various Sources of Energy: trend, possibilities and challenges
5.2 Role of IPP (Independent Power Producer), opportunities and challenges
5.3 Power Purchase Agreement (PPA), Power development agreement (PDA)
5.4 Concept of energy exchange pool market, energy banking
5.5 Regional and sub-regional interconnections with Nepalese grid

नेपाल विद्युत प्राधिकरण

प्राविधिक सेवा, कम्प्यूटर इञ्जिनियरिङ्ग समूह, तह-७ इञ्जिनियर पदको खुला प्रतियोगितात्मक परीक्षाको पाठ्यक्रम

द्वितीय पत्रः

सेवा सम्वन्धी विस्तृत ज्ञान

खण्ड (क) ५० अंङ्क

1. **Concept of Computer System**

   Introduction to computer system, Computer Software and its type, Development of computer languages and its type, Translators and Its type (Assembler, Compiler, Interpreter), Linker and Loader, Basic computer architecture and its components, overview of computer hardware components, Input and output devices, Expansion cards and peripherals; Power requirements for computer installation, UPS, Environmental conditioning requirements for computer installation; Computer Performance Testing methods

2. **Fundamental of Digital System**

   Logic Gates, Boolean Laws and Theorems, Product-of-Sums Method, Sum-of-Products Method, Karnaugh Map (up to Four variables), Multiplexetures, Demultiplexetures, Decoder, Encoder, Binary Addition, Binary Subtraction, operation on Unsigned and Signed Binary Numbers, RS Flip-Flops, Gated Flip-Flops, Edge Triggered Flip-Flops, J K Mater- Slave Flip-Flops, Registers and Counters, Excitation maps and realization of Sequential Machines

3. **Foundation of Microprocessor**

   Programming with 8085 and 8086 Microprocessor, Internal Architecture and Features of 8085 microprocessor, Instruction Format and Data Format, Addressing Modes of 8085, Memory Device Classification and Hierarchy, Programmable Peripheral Interface (PPI), Direct Memory Access (DMA) and DMA Controllers, Interrupt Service Routine, Interrupt Processing in 8085, Interrupt Processing in 8086, Flynn's Classification

4. **Computer Architecture**

   Computer configuration, Microinstruction Format, Design of control unit, CPU Structure and Function, Arithmetic and logic Unit, Instruction formats, addressing modes, Data transfer and manipulation, RISC and CISC architecture, Pipelining parallel processing, Elements of Cache design, Input-Output organization, Characteristics of multiprocessors, Inter-processor Communication and synchronization

5. **Operating System**

   Evolution of Operating System, Type of Operating System, Operating System Components, Operating System Structure, Operating System Services, Introduction to Process, Process description, Process states, Process control, Threads, Processes and Threads, and Types of scheduling, Principles of Concurrency, Critical Region, Race Condition, Mutual Exclusion, Semaphores and Mutex, Message Passing, Monitors, and Classical Problems of Synchronization. Memory Management, Memory address, Swapping and Managing Free Memory Space, Virtual
   Memory Management, Demand Paging, Performance, and Page Replacement Algorithms, introduction to File, Directory and File Paths, File System Implementation

6. **Embedded System**

   Embedded Systems overview, Classification of Embedded Systems. Custom Single-Purpose Processor Design, Optimizing Custom Single-Purpose Processors, Development Environment, Application-Specific Instruction-Set Processors

Real-Time Operating and Control system, Open-loop and Close-Loop control System overview, Control System and PID Controllers, Software coding of a PID Controller, PID Tuning, VHDL Overview, Overflow and data representation using VHDL, Design of combinational and sequential logic using VHDL

7. **Concept of Computer Programming: C and C++**

C programming: C Tokens, Operators, Input/output, Control Statements, Looping, Functions, Array, and String manipulations, Pointers, Structure and Data Files

C++ Programming: Function Overloading, Default Argument, concept of Class and object, Constructor and Destructor, static Data Member and static Function, Friend Function and Friend Classes, Operator overloading (unary, binary), Inheritance (single, multiple, multilevel, hybrid, multipath), Pure Virtual Function, and concept of Templates and Exception Handling

खण्ड (ख) ५० अंङ्क

8. **Data Structure and Algorithm**

Time and space analysis of algorithms (Big oh, omega and theta notations). Stack and queue implementation and Application, Stack and Queues as list; Dynamic implementation of linked list- Singly Linked list, Doubly Linked list, and Circular Linked list. Concept of Tree, insertion/deletions in Binary Tree, Tree traversals, AVL balanced trees, The Huffman algorithm, M-way search trees, B-Tree, and Red Black Tree; Sorting-internal and external sorting, Insertion and selection sort, Exchange sort, Merge and Redix sort, Shell sort, Heap sort, Search- Sequential search, Binary search, General search tree, Hashing; Graphs – types of graphs, representation of Graph, Transitive closure of graph, Warshall's algorithm, Graph Traversal, Topological Sorting, Minimum spanning trees, Shortest-path algorithm

9. **Theory of Computation**

Introduction to Finite Automata and Finite State Machine, Equivalence of DFA and NDFA, Minimization of Finite State Machines, Regular Expressions, Equivalence of Regular Expression and Finite Automata, Pumping lemma for regular language, Context Free Grammar (CFG), Parse tree and its construction, Ambiguous grammar, Chomsky Normal Form (CNF), Push down automata, Equivalence of CFG and PDA, Pumping lemma for context free language, and Properties of context free, Turing Machines, Notations of Turing Machine, Turing Machine as a Language Recognizer, Turing Machine as a Computing Function, Class P, Class NP and NP-complete problems, Chomsky Hierarchy

10. **Database Management System**

Data Abstraction and Data Independence, Schema and Instances, E-R Model, Strong and Weak Entity Sets, Attributes and Keys, Different Normal Forms (1st, 2nd, 3rd, BCNF, DKNF), Functional Dependencies, Integrity Constraints and Domain Constraints, Relations (Joined, Derived), Queries under DDL and DML Commands, Embedded SQL, Views, Assertions and Triggering, Relational Algebra, Query Cost Estimation, Query Processing and Optimization Transactions, ACID properties, Concurrent Executions, Serializability Concept, Lock based Protocols, Deadlock handling and Prevention, Recovery techniques

11. **Software Engineering and Object-Oriented Analysis & Design**

Software Engineering: Software characteristics, Software quality attributes, Software process model (Agile Model, V-Model, Iterative Model, Prototype Model, and Big Bang Model), Computer-Aided Software Engineering, Functional and non–functional requirements, Software Design process, Software Testing, Test case design, Test automation, Algorithmic cost modeling and estimation, Software quality assurance, Statistical software quality assurance, ISO standards, CMMI, SQA plan, Software

configuration management, Version and release management and CASE tools for configuration management

Object Oriented Design and Analysis: Defining Models, Requirement Process, Use Cases, Object Oriented Development Cycle, Unified Modeling Language, Building Conceptual Model, Adding Associations and Attributes, and Representation of System Behavior. Programming and Development Process, Mapping Design to Code, from Design Class Diagrams, Creating Methods from Collaboration Diagram, Updating Class Definitions, Classes in Code, and Exception and Error Handling

12. **Artificial Intelligence**

Concept of AI: AI Perspectives, Structure of Intelligent agent, Properties of Intelligent Agents, Types of Agents, Problem as a state space search, Constraint satisfaction problem, Uninformed search, Informed search and Adversarial search techniques, Semantic Nets and Frames, Resolution Refutation system

NLP and Expert Systems: Expert system and Architecture of an expert system, Natural Language Processing, Steps of Natural Language Processing, Applications of NLP, NLP Challenges. Fuzzy learning and Fuzzy Inferences System, Genetic Algorithm.

Neural Networks: Mathematical Model of Artificial Neural Network (ANN), Activation functions, Architectures of Neural Networks, The Perceptron, The Learning Rate, Gradient Descent, The Delta Rule, Multilayer Perceptron, Back propagation Algorithm, and Self-organizing Map

13. **Computer Network and Information Security**

Concept of Computer network and its Security: Networking model, Protocols and Standards, OSI Reference model and TCP/IP Protocol suite, Networking Devices and Transmission media; Error Detection and Corrections, Flow Control, Subnetting, Routing Protocols, Routing algorithms; Transition from IPv4 to IPv6; Transport protocols, Flow control & buffering, Congestion control algorithm, Web (HTTP & HTTPS), File Transfer (FTP, PuTTY, Win SCP), and Concept of traffic analyzer (MRTG, PRTG, SNMP, Packet tracer, Wireshark)

Network Security: Types of Computer Security, Types of Security Attacks, Principles of cryptography, RSA Algorithm, Digital Signatures, securing e-mail (PGP), Securing TCP connections (SSL), Network layer security (IPsec, VPN), Securing wireless LANs (WEP), Firewalls

Information Security: Overview of information security concepts and terminologies; Threats, vulnerabilities, and risk assessment; Legal, ethical, and privacy considerations; Security risk management and assessment; Incident response planning and procedures; Security awareness and training programs; Business continuity and disaster recovery planning; Security Policies and Compliance

IT System Audit: Internal Check and Audit, Third Party Audit

14. **Emerging technology**

Introduction to Cloud Computing: Overview of cloud computing concepts and terminologies, Cloud Deployment Models, and Cloud Service Models

Introduction to Big Data: Overview of big data concepts, characteristics, and sources, Big Data Applications and Use Cases

Introduction to IoT: Overview of IoT concepts, terminologies, and applications, IoT in different domains: healthcare, smart cities, agriculture; Ethical and Societal Implications of IoT (Machine Learning and Recommendation System)