

नेपाल विद्युत प्राधिकरण

प्राविधिक सेवा, सबै 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	प्रश्नसंख्या × 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 लामो उत्तर आउने प्रश्न	६ प्रश्न * ५ अङ्क २ प्रश्न * १० अङ्क	१ घण्टा ३० मिनेट
द्वितीय	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 :**

- लिखित परीक्षाको माध्यम भाषा नेपाली वा अंग्रेजी अथवा नेपाली र अंग्रेजी दुवै हुन सक्नेछ ।
- प्रथम र द्वितीय पत्रको लिखित परीक्षा छुट्टाछुट्टै हुनेछ ।
- लिखित परीक्षामा सोधिने प्रश्न संख्या र अङ्कभार यथासम्भव सम्बन्धित पत्र / विषयमा दिईए अनुसार 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 ।
- वस्तुगत बहुवैकल्पिक हुने परीक्षामा परीक्षार्थीले उत्तर लेखदा अंग्रेजी 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 रद्द हुनेछ ।
- बहुवैकल्पिक प्रश्नहरू हुने परीक्षामा कुनै प्रकारको क्याल्कुलेटर (Calculator) प्रयोग गर्न पाइने छैन ।
- विषयगत प्रश्नहरूको 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 टिप्पणीहरू (Short notes) सोध्न सकिनेछ ।
- विषयगत प्रश्न हुने पत्र/विषयका प्रत्येक खण्डका प्रश्नका लागि छुट्टाछुट्टै उत्तरपुस्तिकाहरू हुनेछन्। परीक्षार्थीले प्रत्येक खण्डका प्रश्नको उत्तर सोही खण्डको उत्तरपुस्तिकामा लेख्नुपर्नेछ ।
- यस पाठ्यक्रम योजना अन्तर्गतका पत्र/ विषय विषयवस्तुमा जुनसुकै कुरा लेखिएको भए तापनि पाठ्यक्रममा परेका कानून, ऐन, नियम, विनियम तथा नीतिहरू परीक्षाको मिति भन्दा ३ महिना अगाडी (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 ।
- पाठ्यक्रम स्वीकृत मिति :- २०८०/०८/२१

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**प्रथम पत्र**

**खण्ड (क) सामान्य ज्ञान र बौद्धिक परीक्षण: ५० अङ्क**

**1. सामान्य ज्ञान: (३०x१ = ३० अङ्क)**

- 1.1 नेपालको भूगोल र आर्थिक तथा सामाजिक क्रियाकलाप: धरातलीय स्वरूपको 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 अवस्था: 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 भूगोल: महादेश, महासागर, अक्षांश, देशान्तर, अन्तर्राष्ट्रिय तिथि रेखा, समय, पर्वतश्रृङ्खला, नदी, हिमनदी, ताल, हिमताल
- 1.6 अन्तर्राष्ट्रिय सम्बन्ध तथा संघ/ संस्था: संयुक्त राष्ट्र संघ र यसका एजेन्सीहरू (UNO and Its Agencies) दक्षिण एशियाली क्षेत्रीय सहयोग संगठन (SAARC) सम्बन्धी जानकारी
- 1.7 राष्ट्रिय तथा अन्तर्राष्ट्रिय महत्वका समसामयिक घटना तथा नविनतम गतिविधिहरू

**2. बौद्धिक परीक्षण: (२०x१ = 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 मामिला: 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

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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

**द्वितीय पत्र:**

**सेवा सम्बन्धी विस्तृत ज्ञान**

**खण्ड (क) : ५० अङ्क**

1. **Hydrology and Sedimentology**
  - 1.1 Rainfall, runoff, and their correlation, stream gauging (selection of sites, types of gauges and measurement); rating curve and its uses
  - 1.2 Velocity & discharge measurement of stream flow; computation of runoff from a catchment area
  - 1.3 Methods of determination the maximum & minimum discharge in a river
  - 1.4 Flow duration curve and its application, design discharge, diversion flood, design flood and maximum probable flood
  - 1.5 Snowfall and its measurements, glacier hydrology, glacier lake and glacier lake outburst phenomena including glacier lake outburst flood (GLOF)
  - 1.6 Sediment: its types, estimation of sediment load in a river, sediment yield, factors that influence sediment yield and its effect in reservoir
  - 1.7 Storage reservoir and potential energy; evaporation losses and methods of reducing evaporation losses from a reservoir & reservoir operation study
  
2. **Hydraulic Engineering**
  - 2.1 Losses in the hydraulic system: head loss, friction loss, local loss, Total head loss; gross head and net head
  - 2.2 Principles of open channel flow and pipe flow; Reynold's Number, Froude Number and their usage, Practical applications of open channel flow and pipe flow
  - 2.3 Purpose, types, selection as well as hydraulic and structural design of Weirs, dams, spillways, intakes, de-silting basins and gates, Canals, box culverts, siphons, aqueducts and forebay, Tunnels, surge tanks, penstock pipes, anchor blocks and saddle piers
  - 2.4 Powerhouse and appurtenant structures
  - 2.5 Slope stabilization measures
  - 2.6 General layout of different project components
  - 2.7 Hydraulic transient analysis
  - 2.8 Knowledge of computer aided design and software packages for the design of different components of hydropower project
  - 2.9 Shallow foundation and deep foundation
  - 2.10 Transmission Line tower foundation
  
3. **Hydro-Mechanical and Electro-Mechanical Installations**
  - 3.1 General knowledge of hydraulic installations such as gates, valves, draft tubes
  - 3.2 General knowledge of hydro-mechanical installations
  - 3.3 Types of turbines, their usage and selection criteria, concept of specific speed
  - 3.4 Need and working principle of governors
  - 3.5 General knowledge of electro-mechanical installations
  - 3.6 Types of generators and their usage
  - 3.7 Need and selection of Transformers and auxiliary equipment
  - 3.8 General knowledge on transmission lines and substations
  
4. **Optimization Studies of Hydropower System**
  - 4.1 Concept and philosophy of hydropower system optimization

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- 4.2 Optimization of: Dam height, water conveyance system and installed capacity
- 4.3 Concept of firm capacity of the plant, dependable capacity, load factor, utilization factor, diversity factor and plant capacity factor
- 4.4 Firm energy, secondary energy, spill energy, useable energy, load curve and plant outage
- 4.5 Concept of daily poundage basin and its importance for run-off river schemes
- 4.6 Importance of storage type hydropower plants in Nepal

### 5. **Project Investigation**

- 5.1 Concept of multipurpose water resources system and its development, modern tools for water resources analysis (ANN, GA, PSO)
- 5.2 Concept of river basin development and integrated water resource management
- 5.3 Guidelines for the study of hydropower projects in Nepal Stages of project studies and field investigation
- 5.4 Basic idea of: Topographical survey, Geological and geotechnical investigation, Seismological study, Hydro-meteorological investigation and sedimentological investigation
- 5.5 Construction materials and its investigation
- 5.6 Concepts of Initial environmental examination (IEE) and environmental impact assessment (EIA) Studies and their importance in Project development

## खण्ड (ख) : ५० अङ्क

### 6. **Surveying**

- 6.1 Introduction and basic principles of surveying
- 6.2 Linear measurement techniques, representation of measurement and common scales, sources of errors; effect of slope and slope correction, and its techniques, Introduction to: chain, tape, ranging rods and arrows, and their uses, measurement and scales, sources of errors, effect of slope and its correction, correction for chain and tape measurements, Abney level and clinometers
- 6.3 Leveling and Contouring: principles of leveling, temporary and permanent adjustment of level, bench marks, booking methods and their reductions, longitudinal and cross sections survey, reciprocal leveling, trigonometric leveling, contour interval and their characteristics, method of contouring
- 6.4 Theodolite traversing: Need of traverse and its significance, computation of coordinates, adjustment of closed traverse and closing errors
- 6.5 Principle of triangulation, Computation of area and volume by different methods
- 6.6 Introduction and Use of Total Station and Electronic Distance Measuring Instruments

### 7. **Construction Materials**

- 7.1 Properties of civil engineering materials: Physical, chemical, thermal and their use in construction
- 7.2 Stones: characteristics and requirements of stones as a construction material
- 7.3 Brick: types and testing of bricks
- 7.4 Ceramic materials: ceramic tiles, Mosaic tiles Cementing materials: types and properties of lime and cement, cement mortar tests
- 7.5 Metals: Steel, types and properties, Alloys of steel
- 7.6 Timber and wood: timber trees in Nepal, types and properties of wood

- 7.7 Miscellaneous materials: Asphaltic materials (Asphalt, Bitumen and Tar), paints, varnishes, glass, insulating and plastic materials, soil properties and its parameters
8. **Concrete Technology**
  - 8.1 Constituents and properties of concrete (physical and chemical) Grade and strength of concrete; effect of properties of constituents on strength of concrete
  - 8.2 water cement ratio and its effect on the quality and strength of concrete
  - 8.3 Concrete mix design, testing of concrete
  - 8.4 Mixing, transportation, pouring and curing of concrete
  - 8.5 Use of steel reinforcements concrete and its applicability
  - 8.6 General knowledge on mixing, transportation, placement and curing of concrete
  - 8.7 Different chemical admixtures in concrete, High strength concrete, green concrete, pre-stressed concrete technology
9. **Structural Analysis and Design**
  - 9.1 Types of structures based on the material used
  - 9.2 Introduction to: Stress and strain, moment of inertia, theory of flexure and torsion
  - 9.3 Analysis of: Beams and frames - bending moment, shear force, deflection of beams and frames
  - 9.4 Analysis of Determinate structures by strain energy methods, Analysis of three hinged Arch beam
  - 9.5 Analysis of Indeterminate structures by: slope deflection method, moment distribution method, Use of influence line diagrams for simple beams
  - 9.6 Concept of reinforced concrete structures, working stress and limit state philosophy
  - 9.7 Analysis of reinforced concrete beams and slabs in bending, shear, deflection, bond and end anchorage
  - 9.8 Design of axially loaded columns with isolated and combined footings
  - 9.9 Concept of pre-stressed reinforced concrete structures
  - 9.10 Analysis of steel and timber structures for standard and built-up sections
  - 9.11 Elements of a Simple Suspension Bridges
  - 9.12 Design of riveted, bolted and welded connections of steel structures in bending
  - 9.13 Design of simple elements of steel structures: ties, struts, axially loaded and eccentric columns
  - 9.14 Design principles of timber: beams and columns
10. **Estimating, Specification and Valuation**
  - 10.1 Types of estimates and their specific uses,
  - 10.2 Procedure of estimating, building estimates, estimates of other civil engineering structures (main items not covered in building estimates)
  - 10.3 Rules and methods of measurement of works and taking out quantities norms and rate analysis
  - 10.4 Preparation of abstract of cost and billing Purpose, types and importance of specification
  - 10.5 Purpose, principles and methods of valuation of civil engineering structures

11. **Basic Drawing Techniques**

- 11.1 Fundamentals of Standard drawing sheets and its essential components dimensions and scale etc.
- 11.2 Drawing tools and equipment
- 11.3 Concept of drafting conventions and symbols
- 11.4 Scale, line diagram preliminary drawings, working drawings, etc.
- 11.5 Orthographic projection, isometric projection/view, pictorial views, and sectional drawing
- 11.6 Introduction to drawings for: topographic, electrical, mechanical, plumbing and structural work
- 11.7 Concept and techniques of free hand drawing

12. **Safety Engineering**

- 12.1 Effects of non-ionizing electromagnetic fields on human body: physical effects of electric shocks, safety and precautions, safety rules and regulation, safety tools and devices for electricity
- 12.2 General knowledge on Safety rules and regulation in the project construction area including
- 12.3 Safety of storage and handling of explosives; Safety of storage and handling of compressed gases and flammable substances; Necessary precaution for electrical equipment in the premises with explosives such as earthing and shielding technique
- 12.4 General knowledge of fire hazard, firefighting technique and equipment
- 12.5 General knowledge on noise hazard, noise hazard sources, its control and effect in health
- 12.6 General knowledge on first aid technique and requirements for accidental cases

13. **Contract Management**

- 13.1 General knowledge of contractual procedures and management; types of contracts, tender, tender notice, tender documents; contractors' prequalification, evaluation of tenders, selection of contractor, contract acceptance, condition of contract, quotation and direct order, contract packaging, dispute resolution, concept of slicing of contract and its affects
- 13.2 Public procurement act and regulations, ADB and WB guidelines for procurement of works, goods and services General knowledge of material management, procurement procedures and material handling