

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: (३०x १ = 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: (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 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

नेपाल विद्युत प्राधिकरण

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

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, विविध समूह, जियोलजी उपसमूह, तह-७ जियोलजिष्ट पदको पदको खुला प्रतियोगितात्मक परीक्षाको
पाठ्यक्रम
द्वितीय पत्र:
सेवा सम्बन्धी विस्तृत ज्ञान
खण्ड (क) : ५० अङ्क

1. **Geology of Nepal Himalaya and Seismicity**
 - 1.1 General Concept of Himalaya, its evolution and its regional framework, Geological map of Nepal, Sedimentary, Igneous and Metamorphic rocks of Nepal Himalayas and their engineering significance
 - 1.2 Physiographic Division of Nepal: Tectonic Division of Himalaya
 - 1.3 Geological structures in Nepal: Major folds, Major thrust systems, active faults and neotectonics activity. Knowledge on major faults and folds (MHT, MFT, MBT, MCT, STDS; Gorkha anticlinorium, major klippe, Active faults of Nepal)
 - 1.4 Seismicity: Seismo-tectonics and its relation to the seismicity of Nepal Himalaya, historical destructive earthquakes, paleo-seismicity in-Nepal and seismic network of Nepal
2. **Igneous and Metamorphic Petrology**
 - 2.1 Magmatism in Nepal Himalaya: different types of igneous rocks and their properties
 - 2.2 Metamorphism in the Nepal Himalaya
 - 2.3 Metamorphism in the Nepal Himalaya and its significance in infrastructure development
3. **Sediments and Sedimentary rocks**
 - 3.1 Sedimentology: Basic understanding of Stratigraphy and Paleontology
4. **Plate Tectonics**
 - 4.1 Understanding of Nappe and klippe, Continental drift: Internal structure of the earth
 - 4.2 Continental reconstructions, Geologic evidence for continental drift, Paleoclimatology, palaeontologic evidence for continental drift, paleomagnetism, sea floor spreading and transform faults
 - 4.3 The framework of plate tectonics: Tectonic Plates and plate boundaries, distribution of earthquakes.
 - 4.4 Continental rifts (Diverging zones) and rifted margins: General characteristics of narrow rifts, General characteristics of wide rifts, volcanic activity
 - 4.5 Converging zones (Orogenic belts): Ocean–continent convergence, compressional sedimentary basins, continent–continent collision, arc–continent collision, terrene accretion and continental growth
 - 4.6 Implications of plate tectonics: Environmental change, economic geology, natural hazards
5. **Mineralogy and Mineral Resources**
 - 5.1 Basics of crystallography and mineralogy
 - 5.2 Mineral Resources: General understanding of mineral potentials of Nepal
 - 5.3 Mineral resources and construction material types used in different for infrastructure development projects, exploration for construction materials for dams, roads and bridges, use of excavation materials as construction materials

5.4 Mineral Resources of Nepal: General understanding of mineral resources of Nepal, Metallic, non-metallic, gemstones, fossil fuels and geothermal resources of Nepal

6. Hydrogeology and Geomorphology

6.1 Hydrogeology

6.1.1 Introduction: Hydrologic cycle, global water resources and the hydrological balance

6.1.2 Soil moisture and Groundwater: Vertical distribution of groundwater, water table, infiltration, soil moisture

6.1.3 Groundwater occurrence: aquifers, types of aquifers, unconsolidated aquifers, Study of springs: types and classifications of springs, recharge of springs, spring water geochemistry, delineation of spring protection zones, groundwater in permafrost regions

6.1.4 Hydrology of Nepal: Major hydrologic systems and their influence on infrastructure development in Nepal.

6.2 Geomorphology

6.2.1 Introduction: Concepts, the geomorphological system, geomorphic scale

6.2.2 Igneous activity and landforms: Intrusive and extrusive constructional forms, igneous destruction landforms

6.2.3 Structure and landforms: Horizontal and domed structures, homoclinic structures, folded structures, faulted structures

6.2.4 Lithology and landforms: Arenaceous, argillaceous, and calcareous landforms, rock strength, geomorphic processes, and landforms

6.2.5 Weathering: The earth-atmosphere interface, processes of weathering, rates of weathering, the weathered mantle

6.2.6 Hill slopes: Introduction, characteristic slopes, classification of hill slopes, origin of hill slopes, hill slope erosion, and evolution of hill slopes

6.2.7 Rivers: Significance, open-channel hydraulics, sediments transport, hydrology, river morphology, channel stability, example of river metamorphosis, rivers, and valley morphology

6.2.8 Drainage basins: The basin geomorphic unit morphometric analysis, morphometric control, drainage basin evolution, drainage basin response. Fluvial depositional landforms: Alluvial fans, valley fill, deltas

6.2.9 Aeolian processes and landforms: Understanding of Aeolian process and Aeolian environments, aeolian deposits in Nepal

6.2.10 Glacier sedimentary system: Glaciers, glacier ice, glacier flow, glacial deposits (Till)

6.2.11 Geomorphology of Nepal: Major geomorphologic landforms in Nepal and their influence on infrastructure development in Nepal.

खण्ड (ख) : ५० अंङ्क

7. Engineering Geology and Geohazards

7.1 Engineering Geology

7.1.1 Basis of Engineering Geology: Development and aims of engineering geology

7.1.2 Engineering Geological Maps: Preparation and significance. engineering geological maps, quality of published information and limitation of liability, aid to engineering geological mapping

- 7.1.3 Investigation of Tunnel and dam site: Tunnel: Geological condition of tunneling, exploration methods of site selection (feasibility, detailed and preconstruction stage), Dams: types of dam., geological problems and failures in dam, geological investigation of dam site, Water Pressure tests (Lugeon test), slope protection of dam site, foundation work for dam, grouting equipment and methods, site selection criteria for dam (preliminary investigation, detailed exploration, preconstruction stage, construction stage)
- 7.1.4 Field tests and measurements: Tests in boreholes: resistance to penetration, strength, and deformation test, in situ stress measurement, tests in large diameter boreholes, shafts and tunnels, in situ shear test, other tests
- 7.1.5 Investigation of road railroad and pavements in plane and hilly region geological considerations for the selection, siting, design and construction
- 7.1.6 Investigation of bridge, embankment, and canals: Classification of bridge, geological considerations for the selection, siting, design, and construction of bridge foundation scouring and mitigation methods, classification of embankments, embankment foundations, embankment control. classification of canal, canal linings and canal drains
- 7.1.7 Foundation of Building: Types of building foundation, residential, commercial, and industrial buildings, power plants and pumping stations, geological considerations in the selection and design of different foundation types, foundation problems and mitigative plans
- 7.2 **Geohazards**
 - 7.2.1 Landslides: Classification, causes, investigation, analysis, and mitigation of landslides. Landslide damming outburst floods impact on infrastructure and mitigative measures. Terminology, classification, causes, stability of slopes, factor of stability, causes and effects of slope movements, threshold slopes, basic mechanism of failure, investigation and mitigation of landslides, landslide hazard mapping techniques, landslide risk assessment, landslide control and management, Bioengineering techniques for slope stabilization and watershed management. Earthquake-induced landslides
 - 7.2.2 Floods: Basic concepts
 - 7.2.3 Debris flows: classification, mechanism of flow, causes and effects, occurrence of debris flow. Flooding: flood hydrograph, factors contributing flooding, flood frequency analysis, flood hazard mapping techniques and design of flood and debris flow control measures
 - 7.2.4 Glacial lake outburst flood (GLOF): Understanding of glacier landforms, definition of moraine and till; Distribution of Glacial lakes in Nepal., Factors contributing GLOF, impacts and mitigation techniques, potentially dangerous glacial lakes in Nepal, Assessment of GLOF potential, modern methods, and equipment for monitoring of potential GLOF
 - 7.2.5 Landslide damming outburst flood (LDOF): Cause, historical cases, prevalence in Nepal, and mitigation plans
 - 7.2.6 Subsidence and settlement: Cause of settlements and subsidence, investigation of potential settlement and subsidence sites, hazard mapping, risk analysis and mitigation
 - 7.2.7 Earthquake: Types of earthquakes, Magnitude, intensity, types of seismic waves; Mechanism causes and seismic waves, Types of Earthquakes,

Elastic rebound Theory, Factors influencing in damage during strong shaking, Earthquake recording and ground motion parameters; Seismic hazard maps, intensity maps and their uses

8. Geophysics

- 8.1 Concepts: Scopes and application of geophysical methods in subsurface investigations; Merits and limitations of geophysical methods; Major fields of geophysical exploration, significance and measurement of physical quantities involved, factors giving rise to noise, qualitative and quantitative interpretations, ambiguities in interpretation, integrated geophysical methods; Understanding of main geophysical methods of subsurface exploration: electrical, seismic, gravity, magnetic, radioactive
- 8.2 Electrical methods: Electrical properties of rock and minerals, electrical field caused by a point charge, SP method, Resistivity methods: physical and geological basis of resistivity method, Vertical electrical sounding (VES), Basic concepts of electrical resistivity tomography.
- 8.3 Ground penetrating radar (GPR): Basic theory, radar reflection profiling, field arrangement and interpretation
- 8.4 Seismic methods: Principles of exploration seismograph, Seismic refraction method: time-distance relationships, Seismic reflection method: Basic concept of seismic refraction tomography

9. Rock Mechanics and Soil Mechanics

9.1 Rock Mechanics

- 9.1.1 Rock strength: Understanding of Rock Mass and Rock Material, Hoek-Brown strength criterion for fractured rock masses: Generalized Hoek-Brown strength criterion, Modulus of deformation, Mohr-Coulomb criterion
- 9.1.2 Rock mass classification: Rock mass quality Q: The Q system, joint orientation, and the Q-system, updating the Q-system, collection of field data, classification of the rock mass, estimation of support pressure, unsupported span, rock mass characterization; Rock mass number: interrelation between Q and RMR, prediction of ground conditions and support pressure
- 9.1.3 Groundwater flowing rock mass: Field identification of groundwater conditions, interpretation of groundwater conditions; understanding of the difference between groundwater flow in rock mass and soil, developing a groundwater model in the site from the field data, groundwater effects on slope stability, reduction in shear strength, reduction in frictional strength, effect of seepage direction
- 9.1.4 Rock slope stability: Stereographic analysis of joint data, pole, point, contour data, Great circles, Lines of intersection; Identification of modes of slope instability Kinematic analysis
- 9.1.5 Stabilization of rock slopes: Stabilization by rock reinforcement, Stabilization by rock removal, Re-sloping and unloading, Trimming, Scaling, Rock removal operations, Protection measures against rock falls

9.2 Soil Mechanics

- 9.2.1 Soil and its properties: Definition of soil, terminology of different soil types, Unified Soil Classification System, particle size and gradation, specific gravity, mass density in terms of water content, determination of

water content, specific gravity, void ratio, porosity, degree of saturation, and permeability. Particle size analysis: sieve and hydrometer analyses, plasticity, liquidity and consistency tests and indices, flow index, toughness index, sensitivity, and thixotropy

- 9.2.2 Stresses and strains: Basic definition and sign conventions for stresses, Equations of static equilibrium, Concept of strain, Hooke's law
- 9.2.3 Shear strength of soils: Understanding of Stress system with principal planes parallel to the coordinate axes, Mohr's Circle, important characteristics of Mohr's Circle, Mohr-Coulomb theory, Main laboratory tests on rock materials
- 9.2.4 Bearing capacity of shallow foundation: Basic definitions, gross and net footing pressure, Foundation Types, Influence, and effects of geological conditions on foundation type selection for different superstructure, main problems of dam foundation, Lugeon test (water pressure test), grouting principles

10. Tunneling and Underground Excavation

- 10.1 **Concept:** Use and scope of underground excavation and Openings, Geological concerns in the siting, design and exploitation of underground spaces, methods of excavation used and appropriate for Nepal, tunnel boring machine (TBM), drilling and blasting, trenchless technology
- 10.2 **Underground supports:** Types of underground support and geological considerations in their selection, design, and installation: description of shield supports, remote and automation support, lining, reinforcements, rock bolting, cable bolting, rock anchoring, roof stretching
- 10.3 **Underground environment:** Concepts of dust suppression, ventilation, lighting, communication, fire protection, underground openings: dimensions, shape, structural response, sequence of excavation, rock conditions, stress distribution and failure prediction, caving and subsidence, failures in underground excavation. Structurally control instability, influence of geometry, in-situ stress
- 10.4 **Design and construction of large excavation:** Understanding of the types of large underground excavations such as hydro-power station caverns, metro railways, large diameter trenches, water carrying tunnels, geological considerations for and in the design of excavations for waste disposal, stability evaluation and analysis – monitoring, back analysis, case histories, understanding of the types of instrumentation and monitoring of load and deformational characteristics of rock mass, excavation in difficult situations – squeezing, freezing and swelling rock mass