

नेपाल विद्युत प्राधिकरण
प्राविधिक सेवा, सबै समूह/उपसमूह, तह ६, सहायक ईन्जिनियर पदको आन्तरिक
प्रतियोगितात्मक परीक्षाको पाठ्यक्रम

पाठ्यक्रम योजनालाई निम्नानुसार दुई चरणमा विभाजन गरिएको छः

प्रथम चरण:- लिखित परीक्षा पूर्णाङ्क:- २००
द्वितीय चरण:- अन्तर्वार्ता पूर्णाङ्क:- ३०

परीक्षा योजना (Examination Scheme)

प्रथम चरण: लिखित परीक्षा

पूर्णाङ्क:- २००

पत्र	विषय	पूर्णाङ्क	उतीर्णाङ्क	खण्ड	परीक्षा प्रणाली	प्रश्नसंख्या * अङ्कभार	समय
प्रथम	व्यवस्थापकीय ज्ञान	१००	४०	क	छोटो उत्तर आउने प्रश्न	२ प्रश्न * ५ अंक	३ घण्टा
					लामो उत्तर आउने प्रश्न	४ प्रश्न * १० अंक	
				ख	छोटो उत्तर आउने प्रश्न	२ प्रश्न * ५ अंक	
					लामो उत्तर आउने प्रश्न	४ प्रश्न * १० अंक	
द्वितीय	सेवा सम्बन्धी (विस्तृत ज्ञान)	१००	४०	क	छोटो उत्तर आउने प्रश्न	२ प्रश्न * ५ अंक	३ घण्टा
					लामो उत्तर आउने प्रश्न	४ प्रश्न * १० अंक	
				ख	छोटो उत्तर आउने प्रश्न	२ प्रश्न * ५ अंक	
					लामो उत्तर आउने प्रश्न	४ प्रश्न * १० अंक	

द्वितीय चरण:- अन्तर्वार्ता

पूर्णाङ्क:- ३०

विषय	पूर्णाङ्क	परीक्षा प्रणाली
अन्तर्वार्ता	३०	मौखिक

द्रष्टव्यः

- लिखित परीक्षाको माध्यम भाषा नेपाली वा अंग्रेजी अथवा नेपाली र अंग्रेजी दुवै हुन सक्नेछ।
- प्रथम र द्वितीय पत्रको लिखित परीक्षा छुट्टा छुट्टै हुनेछ।
- लिखित परीक्षामा सोधिने प्रश्नसंख्या र अंकभार यथासम्भव सम्बन्धित पत्रविषयमा दिईए अनुसार हुनेछ। /
- वस्तुगत बहुवैकल्पिक (Multiple Choice) प्रश्नहरूको गलत उत्तर दिएमा प्रत्येक गलत उत्तरवापत २० प्रतिशत अंक कट्टा गरिनेछ। तर उत्तर नदिएमा त्यसवापत अंक दिईने छैन र अंक कट्टा पनि गरिने छैन।
- वस्तुगत बहुवैकल्पिक हुने परीक्षामा परीक्षार्थीले उत्तर लेखदा अंग्रेजी ठुलो अक्षर (Capital Letter) A,B,C,D मा लेख्नु पर्नेछ। सानो अक्षर (Small Letter) a,b,c,d लेखेमा वा अन्य कुनै संकेत गरेको भए सबै उत्तरपुस्तिका रद्द हुनेछ।
- बहुवैकल्पिक प्रश्नहरू हुने परीक्षामा कुनै प्रकारको क्याल्कुलेटर (Calculator) प्रयोग गर्न पाईने छैन।
- विषयगत प्रश्नहरूको हकमा 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 पत्रविषयमा प्रत्येक खण्डका प्रश्नका लागि छुट्टाछुट्टै उत्तरपुस्तिकाहरू हुनेछन्। परीक्षार्थीले / प्रत्येक खण्डका प्रश्नको उत्तर सोही खण्डको उत्तरपुस्तिकामा लेख्नु पर्नेछ।
- यस पाठ्यक्रम योजना अन्तर्गतका पत्रविषयका विषयवस्तुमा जुन सुकै कुरा लेखिएको भए तापनि पाठ्यक्रममा / संशोधन भएका वा) महिना अगाडि ३ विनियम तथा नीतिहरू परीक्षाको मिति भन्दा ,नियम ,ऐन ,परेका कानून कायम रहेकालाई यस पाठ्यक्रममा परेको सम्झनु पर्नेछ। (संशोधन भई हटाईएका वा थप गरी संशोधन भई
- प्रथम चरणको परीक्षावाट छनौट भएका उम्मेदवारलाई मात्र दोश्रो चरणको परीक्षामा सम्मिलित गराईनेछ।
- पाठ्यक्रम स्वीकृत मिति: - २०८०/०८/२१

नेपाल विद्युत प्राधिकरण
प्राविधिक सेवा, सबै समूह/उपसमूह, तह ६, सहायक ईन्जिनियर पदको आन्तरिक
प्रतियोगितात्मक परीक्षाको पाठ्यक्रम

प्रथमपत्र

व्यवस्थापकीय ज्ञान

खण्ड (क) - ५० अङ्क

विद्युत विकास र संस्थागत जानकारी

१. नेपाल विद्युत प्राधिकरणको परिचय र कार्यहरू
२. नेपालको उर्जा विकासमा नेपाल विद्युत प्राधिकरण र निजी क्षेत्रको भूमिका
३. नेपालको आर्थिक, सामाजिक विकासमा नेपाल विद्युत प्राधिकरणको भूमिका
४. नेपालमा सार्वजनिक संस्थान स्थापनाको उद्देश्य तथा यसका भूमिका, उपलब्धी एवम चुनौतीहरू
५. संघीय अवधारणा अनुसार नेपाल विद्युत प्राधिकरणको पुनःसंरचना
६. आवधिक योजनामा उर्जा विकास सम्बन्धी व्यवस्था
७. दिगो विकास र वातावरण
८. विद्युतका नियामक निकायहरूको जानकारी
 - ८.१ उर्जा, जलस्रोत तथा सिंचाई मन्त्रालय
 - ८.२ जल तथा उर्जा आयोग
 - ८.३ विद्युत नियमन आयोग
 - ८.४ विद्युत विकास विभाग
९. उर्जाका स्रोतहरू
१०. नेपालमा उर्जा विकासको अवस्था, सम्भावना, समस्या, अवसर र चुनौतीहरू
११. आयोजना व्यवस्थापन र यसका चुनौतीहरू
१२. Energy Exchange, Energy Trading, Energy Banking, Energy Pool Market, Regional Grid

संविधान, ऐन, नियम तथा विनियमहरू

१. नेपालको संविधान,
२. नेपाल विद्युत प्राधिकरण ऐन, २०४१
३. विद्युत ऐन, २०४९
४. विद्युत चोरी नियन्त्रण ऐन, २०५८
५. विद्युत नियमन आयोग ऐन, २०७४
६. वातावरण संरक्षण ऐन, २०७६
७. जग्गा प्राप्ती ऐन, २०३४
८. सार्वजनिक खरिद ऐन, २०६३
९. सार्वजनिक खरिद नियमावली, २०६४
१०. वातावरण संरक्षण नियमावली, २०७७
११. विद्युत चोरी नियन्त्रण नियमावली, २०५९
१२. नेपाल विद्युत प्राधिकरण, प्रचलित कर्मचारी सेवा शर्त विनियमावली
१३. नेपाल विद्युत प्राधिकरण, प्रचलित आर्थिक प्रशासन विनियमावली
१४. सामुदायिक ग्रामिण विद्युतीकरण विनियमावली, २०७१

नेपाल विद्युत प्राधिकरण
प्राविधिक सेवा, सबै समूह/उपसमूह, तह ६, सहायक ईन्जिनियर पदको आन्तरिक
प्रतियोगितात्मक परीक्षाको पाठ्यक्रम
१५. विद्युत वितरण विनियमावली, २०७८

खण्ड (ख) - ५० अङ्क

1. **Hydropower Development in Nepal:** Historical background of hydropower development; Geographical, Geological, and Topographical opportunities and challenges of hydropower development in Nepal; Estimation of power and energy, Stages of hydropower development - Reconnaissance, Pre-feasibility, Feasibility study and detail design, Cost-benefit analysis; Tendering and contracting; Roles and responsibilities of owner, consultant, and contractor; Operation and maintenance
2. **Planning and Operational Issues in Hydropower:** Project Cycle; Hydropower Planning – site selection, capacity optimization; Types of hydropower projects and their selection – ROR, PROR, Storage and Pump Storage projects; Sediment Handling in Hydropower Projects; Project type mix and its importance; Selection of turbines and generators; Multipurpose storage hydropower projects and inter-basin transfer
3. **Electro- Mechanical and Hydro-Mechanical Equipments:** Duties and responsibilities of the operator in charge of a plant; Inspection requirement and concept and importance of preventive, corrective, routine, and scheduled maintenance; Occupational health and safety in operation and maintenance at the power house; Fire hazard and fire fighting in power house and switch yard. Issues and challenges of transporting heavy equipment to the site
4. **Transmission and Distribution:** Existing and planned voltage level of Nepalese transmission & distribution systems and selection criteria; Alignment fixing criterion of transmission and distribution line; Clearance Requirement of conductors at different voltage level; Social issues during routing and construction of distribution lines; Roles and responsibilities of community electricity user groups in distribution system; Transmission system in Nepali context; Cross-border and regional inter-connections; Occupational health and safety in operation and maintenance of transmission lines, substations, and distribution systems; Fire hazard and fire fighting in substations; Safety tools and equipment, Safety Protocol
5. **Power System in Nepal:** Load Forecasting; Peak Load and Peak Demand, Energy mix and Generation mix; Major power stations and their main features, Types and sizes of overhead conductors and underground cables commonly used for transmission and distribution lines; Typical single and three phase distribution transformer sizes and their voltage ratings utilized by NEA and BPC; TOD meters and its tempering issues; Energy audit; Technical and non-technical losses in transmission and distribution systems; Loss reduction measures; Concept of smart meter and smart grid; PPA, PDA, PPA-Guidelines; Electricity market, Cross border and regional power trading issues and opportunities

नेपाल विद्युत प्राधिकरण
प्राविधिक सेवा, सिभिल सेवा/समूह, तह ६, सहायक ईन्जिनियर पदको आन्तरिक प्रतियोगितात्मक परीक्षाको पाठ्यक्रम
द्वितीयपत्र
सेवा सम्बन्धी विस्तृत ज्ञान
खण्ड (क) - ५० अङ्क

1. Fluid Mechanics and Hydraulics

- 1.1 Basic concept of fluid and its Application in civil engineering
- 1.2 Physical Properties of Fluid: Mass density, specific gravity, specific weight, viscosity
- 1.3 Hydro-statics: Pascal's Law, Hydrostatic Law, Measurement of Pressure, Pressure force on vertical, horizontal, inclined and curve surfaces and its points of application, centre of pressure, Archimedes's Principle, Buoyancy and flotation. Stability of floating and submerged bodies
- 1.4 Hydro-dynamics: Energy of flowing fluid, Principle of conservation of Energy, Euler's equation along streamline. Bernoulli's equation and its applicability
- 1.5 Hydro-kinematics: Different types of fluid flow: Laminar and turbulent flows, Steady and unsteady flows, Uniform and non-uniform flows, Compressive and incompressible flows, Ideal and real flows, Reynolds, Euler's and Navier-Stoke's equation of motions
- 1.6 Flow measurement: Discharge through a sharp-edged orifice, Discharge over rectangular, triangular and trapezoidal weirs and notches, Venturimeter and its application

2. Soil Mechanics

- 2.1 Index properties of soil: Mechanical analysis, Sieve analysis, Particle size distribution, Soil consistency limits and Plasticity index
- 2.2 Three phase system of soil, solid, water and air relationship in a soil: volume relationships, weight relationships
- 2.3 Soil water relation: Water table, Permeability, Darcy's law
- 2.4 Compaction and consolidation: Major differences and methods, factors affecting, measurement of primary and secondary consolidation

3. Engineering Mechanics, Strength of Materials and Mechanics of Structures

- 3.1 Resolution and composition of Forces: Parallelogram law of forces, Triangular law of forces, composition and resolution of forces, Resultant force
- 3.2 Equilibrium: Lami's theorem, Moment and Varignon's theorem, condition of equilibrium of rigid bodies under the action of coplanar forces
- 3.3 Simple stress and strain: Hook's law, Young's modulus of elasticity, Bulk modulus, Modulus of rigidity, Thermal stress, Poisson's ratio
- 3.4 Centroid Centre of gravity of various bodies (areas and volume)
- 3.5 Shear force and bending moments of simply supported beams under various types of loadings

4. Basic Drawing Techniques

- 4.1 Purpose and importance of drawing as language of engineering
- 4.2 Fundamentals of Standard drawing sheets Format of drawing sheets, types and its essential components
- 4.3 Concept and techniques of free hand drawing
- 4.4 Drawing scales, dimensioning, lettering
- 4.5 General knowledge of drawing tools and equipment

नेपाल विद्युत प्राधिकरण

प्राविधिक सेवा, सिभिल सेवा/समूह, तह ६, सहायक ईन्जिनियर पदको आन्तरिक प्रतियोगितात्मक परीक्षाको पाठ्यक्रम

- 4.6 Concept of drafting conventions and symbols
- 4.7 Use of district maps, cadastral maps, Fin-maps for engineering purposes
- 4.8 Scales using for site plans; Introduction to preliminary drawings, working drawings, etc.
- 4.9 Orthographic projection; first and third angle projection, pictorial view, Sectional and Isometric views
- 4.10 Introduction to Civil Engineering drawings: Site plan, preliminary drawings, working drawings, topographic, electrical, mechanical, plumbing and structural drawings

5. Surveying

- 5.1 Introduction and basic principles of surveying General concept and classification of surveying and its basic principles
- 5.2 Linear measurement techniques, representation of measurement and common scales, sources of errors; effect of slope and slope correction Tape/ chain triangulation, sources of errors, effects of slope, tape/ chain correction
- 5.3 Compass and plane table survey: types of compass; problems and sources of errors of compass survey; bearings; principles and methods of plane table survey, computing areas and volumes
- 5.4 Leveling and Contouring General knowledge on 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, Preparing plans, longitudinal and cross sections
- 5.5 Introduction to Theodolite traversing: Need of traverse and its significance; computation of coordinates; adjustment of closed traverse and closing errors.
- 5.6 Principle of triangulation, Computation of area and volume by different methods
- 5.7 Introduction and Use of Total Station and Electronic Distance Measuring Instruments
- 5.8 Introduction and use of Total station equipment's and its importance.

खण्ड (ख) - ५० अङ्क

6. Construction Materials

- 6.1 Properties of civil engineering materials: Physical, chemical, thermal etc. General knowledge of building materials, their different properties and their use in construction
- 6.2 Stones: characteristics and requirements of stones as a construction material Stone: Quarrying, dressing, seasoning, methods of laying, testing, characteristics of good building stones
- 6.3 Bricks: types and testing of bricks Composition, functions, and preparation of bricks, moulding, drying, burning, testing; types of bricks, qualities of first class bricks
- 6.4 Cementing materials: types and properties of lime and cement; cement mortar tests. Cement: Ingredients, storage, transportation, types, testing, characteristics of good cement (OPC), and cement mortar and their characteristics
- 6.5 Cement concrete: Concrete mix design, concrete tests: cube test, slump test. Water - cement ration and its role in concrete strength and workability
- 6.6 Reinforced cement concrete: Bar bending schedule, form work, development lengths, and clear covers and cover strips, casting and curing

नेपाल विद्युत प्राधिकरण

प्राविधिक सेवा, सिभिल सेवा/समूह, तह ६, सहायक ईन्जिनियर पदको आन्तरिक प्रतियोगितात्मक परीक्षाको पाठ्यक्रम

- 6.7 Concrete blocks, types, strength and their uses.
 - 6.8 Ceramic materials: ceramic tiles, Mosaic tiles
 - 6.9 Metals: Steel; types and properties; Alloys of steel.
 - 6.10 Timber and wood: timber trees in Nepal, types and properties of wood.
 - 6.11 Miscellaneous materials: Asphaltic materials (Asphalt, Bitumen and Tar); paints, varnishes, glass, insulating and plastic materials, soil properties and its parameters
 - 6.12 Quality control and maintenance management, Nano Technology in QC
7. **Construction Management**
- 7.1 Planning of construction site, scheduling of construction items, monitoring of construction works and quality control methods and technology
 - 7.2 Project scheduling (bar chart, CPM, PERT) Network techniques: Bar chart, CPM and PERT; modern tools of construction management, Construction Management in Developing Countries
 - 7.3 Contract: Essentials, types, conditions, documents, and management
 - 7.4 Tender and tender notice, Standard Bidding of Goods and Works
 - 7.5 Duties and responsibilities of Client, Consultant, and Contractor
 - 7.6 Safety engineering: Safety measurement of labor, safety wearing, safety tools. Accident and its cause and primary treatment. Workers insurance and its policy; Professional liabilities insurance and its claim.
 - 7.7 Claim or variations in construction and their management.
 - 7.8 Dispute resolution
8. **Estimating and Costing**
- 8.1 Types of estimates and their specific uses, Concept of estimates, their types and specific uses
 - 8.2 Conversion of units: SI, Metric and FPS and vice versa
 - 8.3 Contract : Essentials, types, conditions, documents, agreement, methods of execution of works
 - 8.4 Rules and methods of measurement of works and taking out quantities
 - 8.5 Procedure of estimating, building estimates, estimates of other civil engineering structures (main items not covered in building estimates)
 - 8.6 Preparation of abstract of cost and billing bill of quantities
 - 8.7 Construction Norms, preparation of bill of quantities and analysis of rates, their types and importance
 - 8.8 Purpose, types and importance of specification
 - 8.9 Purpose, principles and methods of valuation of civil engineering structures
9. **Computer Application**
- 9.1 Operating system: Importance, uses and types (MS-DOS, Windows)
 - 9.2 MS-WINDOWs based word processing: Editing and formatting documents
 - 9.3 MS-WINDOWs based spread sheet processing: Editing and formatting spread sheets, presentation of graphs, Bar chart.
 - 9.4 Creating database package: Sorting, replacing, listing fields, screen formatting of data
 - 9.5 Computer viruses and their remedies: scanning, cleaning, recovering data or damage files
 - 9.6 CAD application in civil engineering: Computer graphics fundamentals, drawing tools bars, pull down menus, data storage and retrieval, coping, mirroring,

नेपाल विद्युत प्राधिकरण

प्राविधिक सेवा, सिभिल सेवा/समूह, तह ६, सहायक ईन्जिनियर पदको आन्तरिक प्रतियोगितात्मक परीक्षाको पाठ्यक्रम
reshaping objects, fine tuning graphics, transforming objects, grouping objects,
printing the drawings

10. NEA and Miscellaneous

- 10.1 Organizational structure and function of NEA, various power plants of Nepal: Their types, silent features, and geographical locations
- 10.2 Power transmission system, voltage levels, lengths, export-import links for power exchange with India
- 10.3 Occurrence and distribution of rainfall in Nepal, Hydrological cycle of Nepal. Measurement of rainfall, Factor affecting rainfall, Measurement of stream discharges, Factors affecting stream run-off. Precipitation characteristics and Catchment characteristics and analysis of rainfall data, Design discharge and Flood discharge, flooding events and its probable effects in hydropower plants
- 10.4 Slope stability of Hydropower construction sites: Head-works sites, conveyance sites, Power house sites. Ground water table and its effects in hydropower construction, Stability analysis of water storage structures (over turning, sliding, crushing and uplift)
- 10.5 Safety measures against probable site accidents and electric shocks, basic knowledge of first aid