नेपाल विद्युत प्राधिकरण

प्राधिक प्रेमा, सिमिल सम्म र विद्युत उपसम्म, तह ६, सहायक इन्जिनियर पदको आन्तरिक प्रतियोगितामध्ये लिखित परीक्षाको पाठ्यक्रम

१. शैक्षिक योग्यता : प्रचलित कर्मचारी सेवा विनियमवाली मान्यता भए अनुसार ।
२. लिखित परीक्षाको विषय, पूर्णांक, परीक्षा प्रणाली, प्रमेयसंग्रह, अंकबार र समय निम्नानुसार हुनेछ ।

<table>
<thead>
<tr>
<th>पत्र</th>
<th>विषय</th>
<th>परीक्षा प्रणाली</th>
<th>प्रमेय संख्या</th>
<th>प्रति प्रमेय अंकबार</th>
<th>पूर्णांक</th>
<th>समय</th>
</tr>
</thead>
<tbody>
<tr>
<td>प्रथम</td>
<td>व्यवस्थापनीय ज्ञान</td>
<td>विषयसूचना</td>
<td>१० मास उत्तर</td>
<td>५० मास अंकबार</td>
<td>६०० मास</td>
<td>३ घण्टा</td>
</tr>
<tr>
<td>द्वितीय</td>
<td>संविधान सम्बन्धी</td>
<td>विषयसूचना</td>
<td>१० मास उत्तर</td>
<td>५० मास अंकबार</td>
<td>६०० मास</td>
<td>३ घण्टा</td>
</tr>
</tbody>
</table>

३. प्रथमपत्र र द्वितीयपत्रको परीक्षा फरक फरक हुनेछ ।
४. परीक्षाको माध्यम नेपाली र अंग्रेजी बि ि दुबे हुनेछ ।
५. पाठ्यक्रममा राखिएका एन, नियम र विनियमहरू परीक्षा हुन भन्दा ३ महिना अगाडिसम्म संशोधन भएकालाई समेत अअन्तर्गत पाठ्यक्रममा समाबेश भएको मानिने छ ।
६. परीक्षामा काली मसी भएको कलम र डाटो भएको प्राथ्म्य गरुरु भएको छ ।

प्रथम पत्र: व्यवस्थापनीय ज्ञान (१०० अंक)

खण्ड क 5 x 10 = ५० अंक

बिद्युत विकास र संस्थागत ज्ञानकारी (२० अंक)

(१) नेपालको जलवायु विकासमा नेपाल बिद्युत प्राधिकरणको भूमिका ।
(२) जलवायु विकासको प्रयोग, निजी श्रेणीको भूमिका ।
(३) नेपालको आर्थिक, सामाजिक विकासमा नेपाल बिद्युत प्राधिकरणको भूमिका ।
(४) नेपालमा सावधान संस्थान स्थापनको उद्वेद्य र यसको भूमिका, उपलब्ध एवम चुनौतीहरू ।
(५) सांख्यिक अवलोकन अनुसार ने.वि.प्र.को पनि संरचना ।
(६) आर्थिक योजनामा गरीब विकास सम्बन्धी व्यवस्था ।
(७) बिद्युत ग्राहक वर्गीकरण र यसको आवेदन ।
(८) बिद्युतको नियमण विनियमहरूको ज्ञानकारी ।
(क) उच्च, मध्य र महत्त्वपूर्ण नियमास्थल
(ख) मध्य र शासकीय आयोग
(ग) बिद्युत नियमण आयोग
(घ) बिद्युत विकास विभाग
(ङ) साप्ताहिक संकेत विकास तथा बिद्युत विकास दलको सम्बन्धी अवधारणा पत्र एवम कार्य योजना, ०७२।
(ः) संस्थानहरूको संरचना तथा व्यवस्थापन ।

संविधान, एन, नियम तथा विनियमहरू (२० अंक)

(१) नेपालको संविधान संविधान
(२) नेपाल बिद्युत प्राधिकरण एन, २०४१
(३) बिद्युत एन, २०४९
(४) जलवायु विकास नीति, २०४८
(५) बिद्युत चोरी नियन्त्रण एन, २०४८
(६) बिद्युत चोरी नियन्त्रण नियमवाली, २०१९
(७) बिद्युत नियमण आयोग एन, २०१४
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.
1. **FLUID MECHANICS AND HYDRAULICS** (10 Marks)
   1.1. Physical Properties of Fluid: Mass density, specific gravity, specific weight, Viscosity.
   1.2. 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.
   1.4. Hydro-kinematics: Different types of fluid flow: Laminar and turbulent flows, Steady and unsteady flows, Uniform and non-uniform flows, Compressible and incompressible flows, Ideal and real flows. Flow measurement: Discharge through a sharp-edged orifice, Discharge over rectangular, triangular and trapezoidal weirs and notches, Venturimeter and its application.

2. **SOIL MECHANICS** (10 Marks)
   2.1. Index properties of soil: Mechanical analysis, Sieve analysis, 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** (10 Marks)
   3.1. Force: 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, Bilk modulus, Modulus of rigidity, Thermal stress, Poisson’s ratio.
   3.4. 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** (10 Marks)
   4.1. Purpose and importance of drawing as language of engineering.
   4.2. 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.
   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, 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** (10 Marks)
   5.1. General concept and classification of surveying and its basic principles.
   5.2. 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. 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 Introduction and use of Total station equipments and its importance.

6. CONSTRUCTION MATERIAL (10 Marks)

7.1 General knowledge of various construction materials, their properties, tests and their use in construction.
7.2 Stone: Quarrying, dressing, seasoning, methods of laying, testing, characteristics of good building stones.
7.3 Bricks: Composition, functions, and preparation of bricks: moulding, drying, burning, testing; types of bricks, qualities of first class bricks.
7.4 Cement: Ingredients, storage, transportation, types, testing, characteristics of good cement (OPC), and cement mortar and their characteristics.
7.5 Cement concrete: Concrete mix design, concrete tests: cube test, slump test. Water - cement ration and its role in concrete strength and workability.
7.6 Reinforced cement concrete: Bar bending schedule, form work, development lengths, and clear covers and cover strips, casting and curing.
7.7 Concrete blocks, types, strength and their uses.

7. CONSTRUCTION MANAGEMENT (10 Marks)

7.1 Planning of construction site, scheduling of construction items, monitoring of construction works and quality control methods and technology.
7.2 Network techniques: Bar chart, CPM and PERT; modern tools of construction management.
7.3 Contract: Essentials, types, conditions, documents, and management.
7.4 Tender and tender notice.
7.5 Duties and responsibilities of Client, Consultant, and Contractor.

8. ESTIMATING AND COSTING (10 Marks)

8.1 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 Bill of quantities and abstract of cost.
8.5 Construction Norms, preparation of bill of quantities and analysis of rates, their types and importance.
8.6 Valuation of Civil Works: Purpose, principle and methods.
8.7 Purpose, principles and methods of valuation.

9. COMPUTER APPLICATION (10 Marks)

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, reshaping objects, fine tuning graphics, transforming objects, grouping objects, printing the drawings.
10. **NEA AND MISCELLNEOUS**

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.
10.4 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.

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