नेपाल विद्युत प्राधिकरण

प्राविधिक सेवा, सिभिल समूह/उपसमूह तह–७ इन्जिनियर पदको
खुला प्रतियोगितात्मक लिखित परीक्षाको पाठ्यक्रम

१. लिखित परीक्षाको विषय, पूर्णाङ्क, परीक्षा प्रणाली, प्रश्नसंख्या, अंकभार र समय निम्नानुसार हुनेछ ।

पत्र	विषय	पूर्णाङ्क	उत्तिर्णाङ्क	परीक्षा प्रणाली		प्रश्न संख्या	प्रति प्रश्न अंकभार	समय
प्रथम	सामान्यज्ञान तथा सेवा सम्बन्धि सामान्य विषय	१००	४०	(क) सामान्यज्ञान र बौद्धिक परीक्षण	वस्तुगत वहु बैकल्पिक प्रश्न	२५	२	२ घण्टा
				(ख) सेवासम्बन्धी सामान्य बिषय	छोटो उत्तर आउने प्रश्न	१०	५	
द्वितीय	सेवा सम्वन्धी	१००	४०	विषयगत	लामो उत्तर आउने प्रश्न	१०	१०	३ घण्टा

२. बस्तुगत प्रश्नमा प्रत्येक प्रश्नका चार वटा सम्भाव्य उत्तर दिइने छ । जस मध्ये एउटा सही उत्तरमा (लोकसेवा आयोगले तोके बमोजिम) चिन्ह लगाउने वा लेख्नु पर्नेछ । गलत उत्तर बापत प्रति गलत उत्तर २० प्रतिशतका दरले अंक घटाइनेछ ।

३. प्राबिधिक सेवा अन्तर्गतका सबै समुह/उपसमुहहरुको प्रथम पत्रको पाठ्यक्रम एउटै हुनेछ । प्रथम पत्रको लिखित परीक्षा सबै समूह/उपसमूहका लागि संयूक्त रुपमा एउटै प्रश्नपत्रवाट एकैदिन वा छुट्टाछुट्टै प्रश्नपत्रवाट छुट्टाछुट्टै दिन हून सक्नेछ ।

४. प्रथमपत्र र द्वितीयपत्रको परीक्षा फरक फरक हुनेछ । द्वित्तिय पत्रमा २ खण्डहरु हुनेछन् । प्रत्येक खण्डको लागि फरक फरक उत्तर पुस्तिका प्रयोग गर्नुपर्नेछ ।

५. लिखित परीक्षाको माध्यम भाषा नेपाली वा अंग्रेजी वा दुवै हुन सक्नेछ ।

६. सामान्यत: प्रत्येक इकाईबाट प्रश्नहरु सोधिनेछन् । प्रत्येक इकाईको अंकभार तोकिए बमोजिम हुनेछ । लामो उत्तर दिनुपर्ने प्रश्न एकै वा खण्ड खण्ड गरी (दुइ वा सो भन्दा बढी) सोध्न सकिनेछ । यस्तो प्रश्न एक भन्दा बढी इकाइबाट पर्ने गरी सोध्न सकिनेछ ।

७. यस पाठ्यक्रममा जेसुकै लेखिएको भएता पनि पाठ्यक्रममा परेका ऐन, नियमहरु परीक्षाको मिति भन्दा ३ महिना अगाडि (संशोधन भएका वा संशोधन भई हटाइएका वा थप गरी संशोधन भई) कायम रहेकालाई यस पाठ्यक्रममा परेको सम्झनु पर्दछ ।

८. परीक्षामा कालो मसी भएको कलम वा डटपेन मात्र प्रयोग गर्नुपर्नेछ ।

<u>प्रथमपत्र: सामान्य ज्ञान तथा सेवासम्बन्धी सामान्य बिषय</u>
<u>(प्राबिधिक सेवा, तह–७ का सबै समूहका लागि)</u>

खण्ड (क): सामान्य ज्ञान र बौद्धिक परीक्षण **[५० अंक]**

१. <u>सामान्यज्ञान</u> : **(१५x२=३०)**

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

ख) नेपालको सामाजिक एवं सांस्कृतिक अवस्था: प्रथा, परम्परा, धर्म, जातजाति, भाषाभाषी, कला, संस्कृति र साहित्य

ग) नेपालमा विद्युत विकास, ऊर्जाका श्रोत र सम्भावना

घ) नेपालको संघीय, प्रादेशिक र स्थानीय संरचना तथा शासन प्रणालीसम्बन्धि जानकारी

ङ) विश्वको भूगोल: महादेश, महासागर, अक्षांश, देशान्तर, अन्तर्राष्ट्रिय तिथि रेखा, समय, पर्वतश्रृंखला, नदी, हिमनदी, ताल, हिमताल

च) अन्तर्राष्ट्रिय सम्बन्ध तथा संघ/संस्था: संयुक्त राष्ट्र संघ र यसका एजेन्सीहरु (UNO and Its Agencies, दक्षिण एशियाली क्षेत्रीय सहयोग संगठन (SAARC) सम्वन्धी जानकारी

छ) राष्ट्रिय तथा अन्तराष्ट्रिय महत्वका समसामयिक घटना तथा नविनतम गतिविधिहरु

२. बौद्धिक परीक्षण:

२.१ Verbal and Non-verbal Aptitude: (१०x२=२०)

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.

२.२ 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): सेवासम्बन्धी सामान्य बिषय (५० अङ्क)

1. Constitution, Act and Rules 3*5= 15

1.1. Present Constitution of Nepal
1.2. Nepal Electricity Act, 2041
1.3. Nepal Electricity Authority, Present Employee Service by laws
1.4. Electricity Regulatory Commission Act, 2074
1.5. Electricity Act, 2049 and Electricity Regulation, 2050
1.6. Public Procurement Act, 2063
1.7. Nepal Electricity Authority, Present Financial Administration by laws
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, 2053 and Environment Protection Regulation, 2054

2. Electricity Development in Nepal 2*5= 10

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. Silent features of energy crisis decade by government of Nepal

3. Development 1*5= 5

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

4. Management and financial analysis: 2*5= 10

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 like CPM, PERT, manpower 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, net present value, payback period, minimum attractive rate of return and their application; Concept of EIRR and FIRR; tariff structure

5. New Trends of Power Sector **2*5= 10**

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 Pool Market and Energy Banking

5.5. Regional and sub regional interconnections with Nepalese grid

द्वितिय पत्र: सेवा सम्वन्धी
(सिभिल उपसमूहका लागि) १०० अङ्क

खण्ड (क) **(5x10=50)**

1. HYDROLOGY AND SEDIMENTOLOGY

1.1. Rainfall, runoff, and their correlation, stream gauging station, rating curve.

1.2. Velocity & discharge measurement; 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. Basic knowledge on snow, 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 and its effect in reservoir.

1.7. Storage reservoir and potential energy; evaporation losses & reservoir operation studies.

2. HYDRAULIC ENGINEERING

2.1 Concept of 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.

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:
- i. Types of turbines, their usage and selection criteria, concept of specific speed
- ii. Need and working principle of governors

3.3 General knowledge of electro-mechanical installations:
- i. Types of generators and their usage
- ii. Need and selection of Transformers and auxiliary equipment

3.4 General knowledge on transmission lines and substations

4. OPTIMIZATION STUDIES

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

5. PROJECT INVESTIGATION

5.1 Concept of multipurpose water resources system and its development
5.2 Concept of river basin development and integrated water resource management
5.3 Concept of screening and ranking of hydropower projects
5.4 Stages of project studies and field investigation.
5.5 Basic idea of : Topographical survey, Geological and geotechnical investigation, Seismological study, Hydro-meteorological investigation and sedimentological investigation
5.6 Construction materials and its investigation
5.7 Concepts of Initial environmental examination (IEE) and environmental impact assessment (EIA) studies and their importance in project development

खण्ड (ख) **(5x10=50)**

6. SURVEYING

6.1 General concept of surveying and its basic principles
6.2 Linear measurements 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 Compass and plane table survey: types of compass; problems and sources of errors of compass survey; bearings; principles and methods of plane table survey
6.4 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
6.5 Introduction to Theodolite traversing: Need of traverse and its significance; computation of coordinates; adjustment of closed traverse and closing errors
6.6 Introduction and use of Total station equipments and its importance

7. CONSTRUCTION MATERIAL

7.1 General knowledge of building materials, their different properties and their use in construction
7.2 Investigation and testing of construction materials
7.3 Natural and artificial building materials and their characteristics and use in construction: Sand, stones, boulders, bricks, concrete blocks
7.4 Concept of cementing materials: types, composition and properties of cementing materials: Lime and cement
7.5 Construction materials: steel and alloys, their types and properties
7.6 Construction materials: wood and timber; their types and properties; Different trees available in the country
7.7 Miscellaneous construction materials: Introduction of Asphaltic materials, paints, varnishes and polymers.

8. CONCRETE TECHNOLOGY

8.1 Constituents of concrete; Physical and mechanical properties of concrete
8.2 Strength of concrete and grade of concrete; effect of properties of constituents on strength of concrete.
8.3 Concept of water cement ratio and its effect on the quality and strength of concrete
8.4 General knowledge of concrete mix design, testing of concrete and concrete test samples
8.5 General knowledge of use of steel reinforcements concrete and its applicability
8.6 General knowledge on mixing, transportation, placement and curing of concrete
8.7 General knowledge of use of different chemical admixtures in concrete for different purposes

9. STRUCTURAL ANALYSIS AND DESIGN

9.1 Introduction to: Stress and strain; moment of inertia; theory of flexure and torsion
9.2 Alysis of:
i) Beams and frames - bending moment, shear force, deflection of beams and frames
ii) Analysis of Determinate structures by energy methods; Analysis of three hinged Arch beam
iii) Analysis of Indeterminate structures by: slope deflection method, moment distribution method, Use of influence line diagrams for simple beams
9.1 Concept of reinforced concrete structures, working stress and limit state philosophy
9.2 Analysis of reinforced concrete beams and slabs in bending, shear, deflection, bond and end anchorage
9.3 Design of axially loaded columns with isolated and combined footings
9.4 Concept of pre-stressed reinforced concrete structures
9.5 Analysis of steel and timber structures for standard and built-up sections
9.6 Design of riveted, bolted and welded connections of steel structures in bending
9.7 Design of simple elements of steel structures: ties, struts, axially loaded and eccentric columns
9.8 Design principles of timber: beams and columns

10. ESTIMATING, SPECIFICATION AND VALUATION

10.1 Concept of estimates, their types and specific uses
10.2 Methods of estimating
10.3 Key components of estimating norms and rate analysis
10.4 Preparation of bill of quantities
10.5 Purpose, types and importance of specification
10.6 Purpose, principles and methods of valuation

11. BASIC DRAWING TECHNIQUES

11.1 Concept of drawing sheet composition and its essential components
11.2 General knowledge of drawing tools and equipment
11.3 Concept of drafting conventions and symbols
11.4 Scales using for site plans; Introduction to preliminary drawings, working drawings, etc.
11.5 Theory of projection drawing; perspective view, orthographic and axonometric projection; first and third angle projection
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:
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
12.1 General knowledge of fire hazard, fire fighting technique and equipment
12.2 General knowledge on noise hazard, noise hazard sources, its control and effect in health
12.3 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 contract; 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 and muster roll; concept of slicing of contract and its affects
13.2 General knowledge on WB and ADB procurement guidelines and standards
13.3 General knowledge of material management, procurement procedures and material handling

***