

# नेपाल विद्युत प्राधिकरण

प्राविधिक सेवा, मेकानिकल समूह, तह-७, इन्जिनियर पदको  
खुल्ला प्रतियोगितात्मक लिखित परीक्षाको पाठ्यक्रम

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 बहु बैकल्पिक प्रश्न | २५            | २                   | २ घण्टा |
|         |   |           |              | (ख) सेवासम्बन्धी सामान्य विषय     | छोटो उत्तर आउने प्रश्न      | १०            | ५                   |         |
| द्वितीय | सेवा सम्बन्धी                               | १००       | ४०           | विषयगत                            | लामो उत्तर आउने प्रश्न      | १०            | १०                  | ३ घण्टा |

- वस्तुगत 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 ।
- प्राविधिक सेवा अन्तर्गतका सबै समूह/उपसमूहहरूको प्रथम पत्रको पाठ्यक्रम एउटै हुनेछ । प्रथम पत्रको लिखित परीक्षा सबै समूह/उपसमूहका लागि संयुक्त रूपमा एउटै प्रश्नपत्रबाट एकैदिन वा छुट्टाछुट्टै प्रश्नपत्रबाट छुट्टाछुट्टै दिन हुन सक्नेछ ।
- प्रथमपत्र र द्वितीयपत्रको परीक्षा फरक फरक हुनेछ । द्वितीय पत्रमा २ खण्डहरू हुनेछन् । प्रत्येक खण्डको लागि फरक फरक उत्तर पुस्तिका प्रयोग गर्नुपर्नेछ ।
- लिखित परीक्षाको माध्यम भाषा नेपाली वा अंग्रेजी वा दुवै हुन सक्नेछ ।
- सामान्यतः प्रत्येक इकाईबाट प्रश्नहरू सोधिनेछन् । प्रत्येक इकाईको अंकभार तोकिए बमोजिम हुनेछ । लामो उत्तर दिनुपर्ने प्रश्न एकै वा खण्ड खण्ड गरी (दुई वा सो भन्दा बढी) सोध्न सकिनेछ । यस्तो प्रश्न एक भन्दा बढी इकाईबाट पर्ने गरी सोध्न सकिनेछ ।
- यस पाठ्यक्रममा जेसुकै लेखिएको भएता पनि पाठ्यक्रममा परेका ऐन, नियमहरू परीक्षाको मिति भन्दा ३ महिना अगाडि (संशोधन भएका वा संशोधन भई हटाइएका वा थप गरी संशोधन भई) कायम रहेकालाई यस पाठ्यक्रममा परेको सम्झनु पर्दछ ।
- परीक्षामा कालो मसी भएको कलम वा डटपेन मात्र प्रयोग गर्नुपर्नेछ ।

**प्रथमपत्र: सामान्य ज्ञान तथा सेवासम्बन्धी सामान्य विषय**  
(प्राविधिक सेवा, तह-७ का सबै समूहका लागि)

खण्ड (क): सामान्य ज्ञान र बौद्धिक परीक्षण

[५० अंक]

१. सामान्यज्ञान :

(१५x२=३०)

- नेपालको भूगोल र आर्थिक तथा सामाजिक कृयाकलाप: धरातलीय स्वरूपको किसिम र विशेषता, नेपालमा पाईने हावापानीको किसिम र विशेषता, नदीनाला, तालतलैया, खनिज पदार्थ, प्राकृतिक स्रोत साधन, विद्युत, शिक्षा, स्वास्थ्य र सञ्चारसम्बन्धी जानकारी
- नेपालको सामाजिक एवं सांस्कृतिक अवस्था: प्रथा, परम्परा, धर्म, जातजाति, भाषाभाषी, कला, संस्कृति र साहित्य
- नेपालमा विद्युत विकास, ऊर्जाका स्रोत र सम्भावना
- नेपालको संघीय, प्रादेशिक र स्थानीय संरचना तथा शासन प्रणालीसम्बन्धि जानकारी

- ड) 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 एजेन्सीहरू (UNO and Its Agencies, दक्षिण एशियाली क्षेत्रीय सहयोग संगठन (SAARC) सम्बन्धी जानकारी
- छ) राष्ट्रिय तथा अन्तर्राष्ट्रिय महत्वका समसामयिक घटना तथा नविनतम गतिविधिहरू

## 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 विषय (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

द्वितीय पत्र: सेवा सम्बन्धी  
(मेकानिकल समूहका लागि)

१०० अङ्क

### Section: A

{5x10=50}

#### 1. Hydro-electric power Plant

- 1.1. Types of hydro-electric plant controls
- 1.2. Essential components, auxiliaries (general, operational, maintenance)
- 1.3. Hydro-electric plant controls, electrical and mechanical equipment, ventilator, cooling and lubrication
- 1.4. Calculation of hydro power, power house planning, maintenance of electrical and mechanical components of plants

#### 2. Hydraulic Machine

- 2.1. Turbines: main types, classification, design, working principles and characteristics of different types of turbines, specific speed, cavitation, efficiencies, performance, specific speed, selection, governing of water turbines
- 2.2. Reciprocating pumps: main components, working principle, single acting and double acting, head discharge characteristics, power and efficiency calculation, seals and packing, common troubles and remedies
- 2.3. Centrifugal pumps: working principle, classification, pumping head, cavitation, power requirements, pump characteristics curves, selection, overhauling, trouble shooting and their remedies

#### 3. Machine elements and lifting equipment

- 3.1. Machine elements: Ball bearing, journal bearing, thrust bearing and roller bearing (construction and types, selection criteria, bearing materials and construction, mounting and alignment), brakes and clutches, V-belts and flat belts, lubrication film temperature and film thickness, clearances and oil grooves, gaskets, sealing,
- 3.2. Lifting equipment: Jacks, pulleys, ropes, cranes

#### 4. Power plant cycles

- 4.1. Classification
- 4.2. Cycles: Rankin cycle, Reheat cycle, Binary vapor cycle, Otto cycle, Diesel cycle, Dual combustion cycle, Gas turbine cycle

#### 5. Steam power plant

- 5.1. Classification of boilers
- 5.2. Combustion equipment for steam boilers, accessories
- 5.3. Steam cooling ponds and cooling towers

#### 6. Gas turbine power plant

- 6.1. Classification, constant processes combustion gas turbines, constant volume combustion gas turbines
- 6.2. Gas turbine fuels
- 6.3. Operation of components of a gas turbine power plant

**7. Diesel engine power plant**

- 7.1 Classification of I.C. engine, combustion processes in C.I. engine
- 7.2 Basic design of C.I. engine combustion, supercharging, turbo charging
- 7.3 Types of diesel engine used for diesel power plants
- 7.4 Operation of a diesel power plant

**Section: B** {5x10=50}

**8. Workshop technology and metrology**

- 8.1 Metal joining: Oxy-acetylene welding, electric arc welding, spot welding, soldering, brazing
- 8.2 Machine tools: lathe, milling, drilling, grinding and shaping machines
- 8.3 Types of fits and tolerances
- 8.4 Linear measurement: block gauge, length bars, comparators
- 8.5 Error in measurement

**9. Lubrication**

- 9.1 Types of lubricants, properties, viscosity units
- 9.2 Grading of lubricating oils, multi grade oils
- 9.3 Commonly available lubricating oils, their selection and applications

**10. Thermodynamics and internal combustion engine**

- 10.1 Basic concepts: thermodynamic system, thermodynamic property, pure substance, Zeroth law
- 10.2 First law of thermodynamics: control mass and control volume formulation
- 10.3 Second law of thermodynamics: heat engine, refrigerator and heat pump, entropy
- 10.4 Thermodynamic cycles: Carnot cycle, Otto cycle, Diesel cycle, Brayton cycle, Rankine cycle
- 10.5 I. C. Engine: classification, components, 2-stroke and 4-stroke engines, performance of I.C. engine, ignition system, cooling system, lubrication system, fuel systems and fuel properties, air pollutants in exhaust gases and measures to control/reduce them

**11. Air compressor and construction equipment**

- 11.1 Salient features of reciprocating air compressors and pneumatic earth drilling equipment
- 11.2 Functions, characteristics and rating of loader, bulldozer, grader and excavators
- 11.3 Servicing requirement of construction equipment

**12. Major components of automobile**

- 12.1 Engine (refer 10.5)
- 12.2 Transmission: clutch, gearbox, propeller shaft, final drive, axles; four wheel drive
- 12.3 Frame and chassis: front axle, steering system, wheels and tyres, suspension system, braking system; electrical system
- 12.4 Accessories: lights, horn, wiper, air conditioner, heater, stereo etc.

**13. Refrigeration and air conditioning**

- 13.1 Basic refrigeration cycles used vapor compression system
- 13.2 Function and use of cycle control components such as expansion device, thermostats and pressure cutouts
- 13.3 Major components of an air conditioning system and their functions, ventilation system and its importance, fresh air requirements for a confined space.

**14. Safety engineering**

- 14.1 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,
- 14.2 Live line maintenance and precautions, explosions of electrical equipment in premises and precautions to be taken, Earthing and shielding techniques
- 14.3 Fire hazards, firefighting techniques and equipment
- 14.4 Noise hazard, sources, control and effect on health, first aid requirements for post-event treatment

**15. Contract management**

- 15.1 Familiarization with procurement guidelines and standards of World Bank, ADB
- 15.2 Preparation of contract documents, specifications, condition of contract and other contractual procedures

