

# नेपाल विद्युत प्राधिकरण

प्राविधिक सेवा, इलेक्ट्रिकल समूह, इलेक्ट्रिकल उपसमूह, तह-५, सुपरभाइजर पदको  
खुल्ला 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	आधारभूत सामान्य ज्ञान र सेवा सम्बन्धी	१००	४०	वस्तुगत बहु बैकल्पिक प्रश्न	खण्ड (क) आधारभूत सामान्य ज्ञान	२०	२	४५ मिनेट
					खण्ड (ख) सेवा सम्बन्धी	३०	२	
द्वितीय	सेवा सम्बन्धी	१००	४०	विषयगत प्रश्न	छोटो उत्तर आउने प्रश्न	१०	५	२ घण्टा ३० मिनेट
					लामो उत्तर आउने प्रश्न	५	१०	

- प्रथमपत्रको खण्ड क सबै समूहको लागि एउटै हुनेछ । खण्ड क समाप्त भएपछि एकै सिटिङ्ग खण्ड ख को परीक्षा हुनेछ । प्रथमपत्रको खण्ड ख र द्वितीयपत्रको पाठ्यक्रम एउटै हुनेछ ।
- वस्तुगत प्रश्नमा प्रत्येक प्रश्नका चार वटा सम्भाव्य उत्तर दिइने छ । जस मध्ये एउटा सही उत्तर लेख्नु पर्नेछ । गलत उत्तर बापत प्रति गलत उत्तर २० प्रतिशतका दरले अंक घटाइनेछ ।
- प्रथमपत्र र द्वितीयपत्रको परीक्षा फरक फरक हुनेछ ।
- परीक्षाको माध्यम नेपाली वा अंग्रेजी भाषा हुनेछ ।
- सामान्यतः प्रत्येक इकाईबाट प्रश्नहरू सोधिनेछन् । इकाईको अंकभार तोकिए बमोजिम हुनेछ । लामो उत्तर दिनुपर्ने प्रश्न एकै वा खण्ड खण्ड गरी (दुइ वा सो भन्दा बढी) सोध्न सकिनेछ ।

## प्रथमपत्र:

### खण्ड (क) आधारभूत सामान्य ज्ञान (प्राविधिक सेवा, तह-५ का सबै समूहका लागि):

- नेपालको भूगोल: धरातलीय स्वरूपको किसिम र विशेषता, नदीनाला, तालतलैया र खनिज पदार्थ, राजनैतिक विभाजन (संघ, प्रदेश तथा स्थानीय तह)
- नेपाल विद्युत प्राधिकरण सम्बन्धि जानकारी: स्थापना, नेपाल विद्युत प्राधिकरणका व्यवसाय/निर्देशनालयहरू, प्राधिकरणको काम, कर्तव्य र अधिकार, संचालक समिति
- दक्षिण एशियाली क्षेत्रीय सहयोग संगठन (SAARC) बारे सामान्य जानकारी
- राष्ट्रिय महत्वका समसामयिक घटना तथा नविनतम गतिविधिहरू ।
- सामान्य गणितिय अभ्यास: अनुपात, भिन्न, प्रतिशत, औषत, अंकगणितिय तर्क, नाफा-नोक्सान, श्रेणीक्रम ।
- विद्युत चोरी नियन्त्रण ऐन, २०५८ अनुसार विद्युत चोरी मानिने अवस्था, विद्युत चोरी नियन्त्रण नियमावली, २०५९ अनुसार विद्युत आपूर्ति बन्द गर्न सक्ने, पूनः जडान गर्ने अवस्था र पुरस्कार व्यवस्था ।
- विद्युत वितरण विनियमावली, २०६९ को विद्युत लाईन एवं मिटर जडान सम्बन्धी व्यवस्था र मिटर जाँच तथा मिटर रिडिङ्ग सम्बन्धी व्यवस्था ।

## प्रथमपत्र खण्ड ख र द्वितीयपत्रको पाठ्यक्रम

### 1. FUNDAMENTALS [5x2=10, 2x5=10]

- Concept of resistance, inductance, capacitance and their role in electric circuits.
- Series and parallel connection of resistance, inductance and capacitance.
- Ohm's law and Kirchoff's law.
- Alternating current fundamentals: Faraday's laws of electromagnetic induction, generation of alternating voltages and currents and their equations and waveforms, amplitude, frequency, phase, phase difference, average and rms values, A.C. through resistance, inductance, capacitance and through their combinations, single phase and three phase AC systems.
- Heating effect of electric current
- General norms of system voltage regulation and frequency regulation.

**2. POWER PLANTS [2x2=4, 1x10=10]**

- Hydroelectric power plants: Merits and demerits, classifications and respective layouts, selection of sites, types of water turbines, their working principles and applications.
- Diesel electric power plants: Merits and demerits, selection of sites, elements of a diesel plant and its layout.
- Non conventional power generation: Photo voltaic or solar cells, solar power generation, wind power generation.
- Base load power plants, peak load power plant
- Plant capacity factor, plant utilization factor, reserve required and types

**3. ELECTRICAL MACHINES [4x2=8, 1x5=5, 1x10=10]**

- D.C. generators: Working principle, types of D.C. generators, external, internal and no load characteristics, losses and efficiency.
- D.C. motors: Working principle, types of D.C. motors, characteristics of D.C. series and shunt motors, losses and efficiency
- Synchronous generator: Working principle, equation of induced E.M.F., short circuit and open circuit characteristics, voltage regulation, losses and efficiency, parallel operation and synchronizing, Alternators connected to infinite bus bars, different types of excitation systems, drying of alternators.
- Three phase induction motors: Working principle, squirrel cage and slip ring motors, characteristic of induction motors, starting torque and torque under running condition, starting of induction motors.
- Transformers: Working principle, E.M.F. equation, transformer at no load and at loaded condition, losses and efficiency, parallel operation, different components of transformers, transformer oil and its role, cooling of transformers, Bucholtz protection.
- Auto transformer.
- Three phase transformers in parallel operation.
- No-load and full load test of transformers.
- Prerequisites for starting of generators in hydro and diesel station.
- Necessity of cooling in power stations
- Role of auxiliary equipments in power stations, storage batteries, their capacities, charging and maintenance.
- Concept of black start units in power stations.

**4. CONTROL AND PROTECTION [3x2=6, 1x5=5, 1x10=10]**

- Necessity of D.C. system in power stations.
- Lead acid and Ni-Cd cells.
- Working principle of bulk oil, vacuum, minimum oil and gas filled circuit breakers.
- Working principle of over current, earth fault and under voltage relays and their importance for protection of the system.
- Instrument transformers and their role in system protection.
- Power line carrier communication and its importance.
- SCADA system.
- Surge arrestor and its importance in protection against lightning.

**5. SUB-STATION AND TRANSMISSION LINE [3x2=6, 1x5=5, 1x10=10]**

- Substations: Substation equipments and their functions, general layout of substation, types of bus bar arrangements, earthing of equipments in a substation.
- Transmission lines: General concept of overhead transmission line and under ground cabling, necessity of high voltage transmission, line parameter, resistance, inductance and capacitance, choice of voltage level, conductor spacing, voltage regulation and efficiency of short and medium transmission lines, sag, tension and clearances, supports and cross arms, insulating materials and their classification, conducting materials, vibrations and dampers in transmission lines..
- Lightning phenomenon, types and functions of lightning arrestor, over head earth wire.
- Corona and its effects, advantages and disadvantages.

**6. DISTRIBUTION AND CONSUMER SERVICES [3x2=6, 1x10=10]**

- Primary distribution system: Radial system, ring main system and interconnected network system
- Secondary distribution system: Three phase four wire distribution, single phase two wire distribution
- Voltage regulation
- Selection of supports and conductors in secondary distribution system
- Earthing of electrical system and equipment
- Consumer supply connection
- General idea of fuse, MCB and MCCB protection
- Uses of relays, contractors and isolators.
- Consumer supply energy meters: Construction and principle of operation, creeping errors and their compensation, testing of energy meters

**7. POWER SYSTEM OPERATION AND MAINTENANCE [3x2=6, 1x5=5]**

- Concept of maximum demand, diversity factor, load factor and load curves, load duration curves, power factor correction and improvement
- Operation of substation during normal and abnormal condition
- Synchronizing and system restoration
- Preventive maintenance in electrical system for transmission lines and its equipment, distribution lines and its equipments, transformers, switchgears, motors, generators, turbines excitation system, and communication system used in power system
- Maintenance of D.C. system
- Safety and precautions, safety rules and regulation, safety tools and devices.

**8. INSTITUTIONAL KNOW-HOW [1x2=2, 1x5=5]**

- General knowledge of Nepal Electricity Authority, its organizational structure and function of various business groups
- General knowledge of various power plants of Nepal, their types, salient features, and their geographical locations
- General knowledge on Nepalese power transmission system, voltage levels and lengths, export-import links for power exchange with India.
- Tarriff system in Nepal.

**9. Electrical Measurement: [2x2=4, 1x5=5]**

- Types and applications of indicating, recording, integrating, analog and digital measurement.
- Concept of measurement of current, voltage, frequency, power and energy.
- Extension of measuring range of ammeter and voltmeter.
- Concept of maximum demand meter and TOD Meter.

**10. Utilization of Electrical Energy: [2x2=4, 1x5=5]**

- Factors governing selection of types and size (rating) of electric motors.
- Causes of low power factor, its effect and method of correction.
- Load curve, load duration curve, load factor, diversity factor.
- Purpose of factory lighting, street lighting and lamps types.

**11. Basic Power Electronics: [2x2=4, 1x5=5]**

- Characteristics of power diode, power transistor and thyristor.
- Principle and purpose of Rectifier, Filter circuits and Inverters.
- AC voltage controller and its application .

**द्रष्टव्यः** पाठ्यक्रममा राखिएका सविधान, ऐन, नियम र विनियमहरू परीक्षा हुनु भन्दा ३ महिना अगाडी सम्म संशोधन वा खारेज भई त्यसको सट्टा हाल प्रचलनमा रहेकालाई सोही अनुरूप पाठ्यक्रममा समावेश भएको मानिने छ ।

