



# औद्योगिक क्षेत्र व्यवस्थापन लिमिटेड

(नेपाल सरकारको स्वामित्व भएको)

प्राविधिक सेवा, ईन्जिनियरिङ्ग समुह/ईलेक्ट्रिकल उपसमुह सब-इन्जिनियर तह-५ पदको  
खुला प्रतियोगितात्मक लिखित परीक्षाको पाठ्यक्रम

यो पाठ्यक्रमलाई देहाय अनुसार दुई चरणमा विभाजन गरिएको छः

- (१) प्रथम चरण लिखित परीक्षा: पूर्णाङ्क २००
- (२) द्वितीय चरण अन्तरवार्ता: पूर्णाङ्क ३०

## परीक्षा योजना (Examination Scheme)

(१) प्रथम चरण लिखित परीक्षा

पत्र	बिषय	पूर्णाङ्क	उत्तीर्णाङ्क	परीक्षा प्रणाली	प्रश्न संख्या	प्रतिप्रश्न अङ्कभार	समय	
प्रथमपत्र	आधारभूत सामान्य ज्ञान र सेवा सम्बन्धी	१००	४०	वस्तुगत बहु वैकल्पिकप्रश्न	खण्ड (क) आधारभूत सामान्य ज्ञान	२०	२	४५मिनेट
					खण्ड (ख) सेवा सम्बन्धी	३०	२	
द्वितीयपत्र	सेवा सम्बन्धी	१००	४०	विषयगतप्रश्न	छोटो उत्तर आउने प्रश्न	१०	५	२ घण्टा ३० मिनेट
					लामो उत्तर आउने प्रश्न	५	१०	

(२) द्वितीय चरण: अन्तरवार्ता

विषय	पूर्णाङ्क	उत्तीर्णाङ्क	परीक्षा प्रणाली	समय
व्यक्तिगत अन्तरवार्ता	३०	-	मौखिक	-

### द्रष्टव्यः

- लिखित परीक्षाको माध्यमभाषा नेपाली वा अंग्रेजी अथवा नेपाली र अंग्रेजी दुवै हुन सक्नेछ।
- प्रथम र द्वितीय पत्रको लिखित परीक्षा छुट्टाछुट्टै हुनेछ।
- लिखित परीक्षामा यथा सम्भव पाठ्यक्रमका सबै एकाईबाट प्रश्नहरु सोधिनेछ।
- वस्तुगत बहुवैकल्पिक (Multiple Choice) प्रश्नहरुको गलतउत्तर दिएमाप्रत्येक गलतउत्तर वापत २० प्रतिशत अङ्क कट्टा गरिनेछ।
- विषयगत प्रश्नहुने पत्र/विषयको प्रत्येक भाग/खण्ड/इकाई प्रश्नका लागि छुट्टैछुट्टै उत्तरपुस्तिकाहरु हुनेछन्। परीक्षार्थीले प्रत्येक भाग खण्ड/इकाई/प्रश्नको उत्तर सोही भाग/खण्ड/इकाई प्रश्नको उत्तरपुस्तिकामा लेख्नु पर्नेछ।
- यस पाठ्यक्रममा जे सुकै लेखिएको भएतापनि पाठ्यक्रममा परेका ऐन नियम तथा विनियमहरु परीक्षाको मितिभन्दा ३ महिना अगाडि (संशोधन भएका वा संशोधन नभई हटाईएका वा थप गरी संशोधन भई) कायम रहेकालाई यस पाठ्यक्रममा परेको सम्झनु पर्दछ।
- प्रथम चरणको परीक्षाबाट छनौट भएका उम्मेदवारहरुलाई मात्र द्वितीय चरणको परीक्षामा सम्मिलित गराइनेछ।
- पाठ्यक्रम लागू मिति: २०७८।०३।०७ गते।



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## प्रथमपत्र:

खण्ड (क) आधारभुत सामान्य ज्ञान (प्राविधिक सेवा, तह-५ समुहका लागि):

[20x2=40]

१. नेपालको संविधान (२०७२) सम्बन्धी आधारभुत जानकारी ।
२. नेपालको भुगोल: धरातलीय स्वरूपको किसिम र विशेषता, नदीनाला, तालतलैया र खनिज पदार्थ, राजनैतिक विभाजन (संघ, प्रदेश तथा स्थानीय तह)
३. औद्योगिक क्षेत्र व्यवस्थापन लिमिटेड सम्बन्धी जानकारी :प्रबन्धपत्र, स्थापना, गठन, उद्देश्य, काम, कर्तव्य र अधिकार ।
४. संयुक्त राष्ट्र संघ (UNO) र दक्षिण एशियाली क्षेत्रीय सहयोग संगठन (SAARC) सम्बन्धी सामान्य जानकारी
५. राष्ट्रिय महत्वका समसामयिक घटना तथा नवीनतम गतिविधिहरू ।
६. सामान्य गणितीय अभ्यास:अनुपात, भिन्न, प्रतिशत, औषत, अंक गणितीयतर्क, नाफा-नोक्सान, श्रेणीक्रम ।
७. औद्योगिक व्यवसाय ऐन, २०७३ को आधारभुत जानकारी ।
८. औद्योगिक क्षेत्र व्यवस्थापन लिमिटेडको कर्मचारी सेवाशर्त नियमावली, २०५४ (पाचौं संशोधन, २०७५) र विद्युत नियमावली २०५९ ।
९. विद्युत चोरी नियन्त्रण ऐन, २०५८ अनुसार विद्युत चोरी मानिने अवस्था, विद्युत चोरी नियन्त्रण नियमावली, २०५९ अनुसार विद्युत आपूर्ति बन्द गर्न सक्ने, पुनः जडान गर्ने अवस्था ।
१०. विद्युत वितरण विनियमावली, २०५९ को विद्युत लाईन एवं मिटर जडान सम्बन्धी व्यवस्था र मिटर जांच तथा मिटर रिडिङ्ग सम्बन्धी व्यवस्था ।

## प्रथमपत्र खण्ड ख र द्वितीयपत्र

### 1. FUNDAMENTALS

[5x2=10, 2x5=10]

- a. Concept of resistance, inductance, capacitance and their role in electric circuits.
- b. Series and parallel connection of resistance, inductance and capacitance.
- c. Ohm's law and Kirchhoff's law.
- d. 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.
- e. Heating effect of electric current
- f. General norms of system voltage regulation and frequency regulation.

### 2. POWER PLANTS

[2x2=4, 1x10=10]

- a. Diesel electric power plants: Merits and demerits, selection of sites, elements of a diesel plant and its layout.
- b. Non-conventional power generation: Photo voltaic or solar cells, solar power generation, wind power generation.
- c. Base load power plants, peak load power plant
- d. Plant capacity factor, plant utilization factor, reserve required and types

### 3. ELECTRICAL MACHINES

[4x2=8, 1x5=5, 1x10=10]



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- a. D.C. generators: Working principle, types of D.C. generators, external, internal and no load characteristics, losses and efficiency.
  - b. D.C. motors: Working principle, types of D.C. motors, characteristics of D.C. series and shunt motors, losses and efficiency
  - c. 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.
  - d. 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.
  - e. 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, Buchholtz protection,
  - f. Fundamental knowledge on Distribution transformer.
  - g. Three phase transformers in parallel operation.
  - h. No-load and full load test of transformers.
  - i. Prerequisites for starting of generators in diesel station.
  - j. Necessity of cooling in power stations
  - k. Role of auxiliary equipments in power stations, storage batteries, their capacities, charging and maintenance.
  - l. Concept of black start units in power stations.
4. **CONTROL AND PROTECTION** **[3x2=6, 1x5=5, 1x10=10]**
- a. Necessity of D.C. system in power stations.
  - b. Lead acid, Ni-Cd and maintenance free Battery
  - c. Working principle of vacuum, minimum oil and air circuit breakers.
  - d. Working principle of over current, earth fault and under voltage relays and their importance for protection of the system.
  - e. Instrument transformers and their role in system protection.
  - f. Power line carrier communication and its importance.
  - g. Surge arrester and its importance in protection against lightning.
5. **SUB-STATION AND TRANSMISSION LINE** **[3x2=6, 1x5=5, 1x10=10]**
- a. Substations: Substation equipments and their functions, general layout of substation, types of bus bar arrangements, earthing of equipments in a substation.
  - b. 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



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transmission lines, sag, tension and clearances, supports and cross arms, insulating materials and their classification, conducting materials, vibrations and dampers in transmission lines..

- Lightening phenomenon, types and functions of lightening 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, MCCB and RCCB 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, TOD Meter fundamentals.

## 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
- Periodic, Preventive, emergency maintenance in electrical system for distribution lines and its equipments, transformers, switchgears, motors, generators, turbines excitation system
- Fault reporting and fault finding : Fault reporting procedures & Maintenance log ,
- Check list of equipment – Daily, Weekly, Monthly and Yearly.
- Duty and responsibilities of shift in charge and technical person in roaster duty.
- Safety and precautions, safety rules and regulation, safety tools and devices.

## 8. INSTITUTIONAL KNOWLEDGE & POWER SYSTEM IN NEPAL

[1x2=2, 1x5=5]

- General knowledge of Industrial District Management Limited, its organizational structure and function of various business groups
- General knowledge of regarding various working stations of Industrial District Management Limited.
- Tariff system in Nepal.
- Synchronizing and system restoration

## 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.



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## 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.
- Knowledge on electrical energy efficiency system

## 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.

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