



# औद्योगिक क्षेत्र व्यवस्थापन लिमिटेड

(नेपाल सरकारको स्वामित्व भएको)

प्राविधिक सेवा, ईन्जिनियरिङ्ग समूह/ईलेक्ट्रीकल उपसमूह ईलेक्ट्रिकल इन्जिनियर तह-७ पदको खुला तथा आन्तरिक 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	विषय	पूर्णाङ्क	उत्तीर्णाङ्क	परीक्षा प्रणाली		प्रश्न संख्या	प्रति प्रश्न अङ्कभार	समय
प्रथम पत्र	सामान्य ज्ञान तथा सेवा सम्बन्धी सामान्य विषय	१००	४०	(क)सामान्य ज्ञान र बौद्धिक परिक्षण	वस्तुगत बहु वैकल्पिक प्रश्न	२५	२	२ घण्टा
				(ख)सेवा सम्बन्धी सामान्य विषय	छोटो उत्तर आउने प्रश्न	१०	५	
द्वितीय पत्र	सेवा सम्बन्धी	१००	४०	विषयगत	लामो उत्तर आउने प्रश्न	१०	१०	३ घण्टा

(२) द्वितीय चरण: अन्तरवार्ता :

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

### द्रष्टव्यः

- लिखित परीक्षाको माध्यम भाषा नेपाली वा अंग्रेजी अथवा नेपाली र अंग्रेजी दुवै हुन सक्नेछ ।
- प्रथम र द्वितीय पत्रको लिखित परीक्षा छुट्टाछुट्टै हुनेछ ।
- लिखित परीक्षामा यथासम्भव पाठ्यक्रमका सबै एकाईबाट प्रश्नहरू सोधिनेछ ।
- वस्तुगत बहुवैकल्पिक (Multiple Choice) प्रश्नहरूको गलत उत्तर दिएमा प्रत्येक गलत उत्तर वापत २० प्रतिशत अङ्क कट्टा गरिनेछ ।
- विषयगत प्रश्न हुने पत्र/विषयको प्रत्येक भाग/खण्ड/इकाई प्रश्नका लागि छुट्टै उत्तरपुस्तिकाहरू हुनेछन् । परीक्षार्थीले प्रत्येक भाग खण्ड/इकाई/प्रश्नको उत्तर सोही भाग/खण्ड/इकाई प्रश्नको उत्तरपुस्तिकामा लेख्नु पर्नेछ ।
- यस पाठ्यक्रममा जे सुकै लेखिएको भएता पनि पाठ्यक्रममा परेका ऐन नियम तथा विनियमहरू परीक्षाको मिति भन्दा ३ महिना अगाडि (संशोधन भएका वा संशोधन भई हटाईएका वा थप गरी संशोधन भई) कायम रहेकालाई यस पाठ्यक्रममा परेको सम्भन्नु पर्दछ ।
- प्रथम चरणको परीक्षाबाट छनौट भएका उम्मेदवारहरूलाई मात्र द्वितीय चरणको परीक्षामा सम्मिलित गराइनेछ ।
- पाठ्यक्रम लागू मिति: २०७८।०३।०७ गते ।



# औद्योगिक क्षेत्र व्यवस्थापन लिमिटेड

(नेपाल सरकारको स्वामित्व भएको)

प्राविधिक सेवा, ईन्जिनियरिङ्ग समूह/ईलेक्ट्रीकल उपसमूह ईलेक्ट्रिकल इन्जिनियर तह-७ पदको  
खुला तथा आन्तरिक प्रतियोगितात्मक लिखित परीक्षाको पाठ्यक्रम

## प्रथमपत्र: सामान्य ज्ञान तथा सेवा सम्बन्धी विषय

[50अङ्क]

### खण्ड (क): सामान्य ज्ञान र बौद्धिक परीक्षण

#### १. सामान्यज्ञान :

(15x2=30)

- १.१ विश्वको भूगोल: महादेश, महासागर, अक्षांश, देशान्तर, अन्तर्राष्ट्रिय तिथि रेखा, समय, पर्वतश्रृंखला, नदी, हिमनदी, ताल, हिमताल
- १.२ नेपालको भूगोल र आर्थिक तथा सामाजिक क्रियाकलाप: धरातलीय स्वरूपको किसिम र विशेषता, नेपालमा पाइने हावापानीको किसिम र विशेषता, नदीनाला, तालतलैया, खनिज पदार्थ, प्राकृतिक स्रोत साधन, विद्युत, शिक्षा, स्वास्थ्य र सञ्चार सम्बन्धी जानकारी
- १.३ नेपालको सामाजिक एवं सांस्कृतिक अवस्था: प्रथा, परम्परा, धर्म, जातजाति, भाषाभाषी, कला, संस्कृति र साहित्य
- १.४ नेपालका प्रमुख प्राकृतिक स्रोतहरू सम्बन्धी जानकारी
- १.५ नेपालको संघीय, प्रादेशिक र स्थानीय संरचना तथा शासन प्रणाली सम्बन्धी जानकारी
- १.६ औद्योगिक क्षेत्र व्यवस्थापन लिमिटेडको गठन, उद्देश्य, कार्य, प्रबन्धपत्र र नियमावली
- १.७ औद्योगिक क्षेत्र व्यवस्थापन लिमिटेड कर्मचारी सेवा शर्त नियमावली, २०५४ (पांचौं संशोधन, २०७५)
- १.८ औद्योगिक क्षेत्र व्यवस्थापन लिमिटेड विद्युत्त नियमावली, २०५९ (पहिलो संशोधन, २०७४)
- १.९ नेपालमा औद्योगिक विकास, ऊर्जाका स्रोत र सम्भावना
- १.१० अन्तर्राष्ट्रिय सम्बन्ध तथा संघ/संस्था: संयुक्त राष्ट्र संघ र यसका एजेन्सीहरू (UNO and Its Agencies), विमस्टेक, आसियान, युरोपियन संघ, दक्षिण एशियाली क्षेत्रीय सहयोग संगठन (SAARC) सम्बन्धी जानकारी
- १.११ राष्ट्रिय तथा अन्तर्राष्ट्रिय महत्वका समसामयिक घटना तथा नवीनतम् गतिविधिहरू

#### २. बौद्धिक परीक्षण:

[10x2=20]

2.1 **Verbal and Non-verbal Aptitude:** 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.

#### 2.2 **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): सेवा सम्बन्धी सामान्य विषय

(५० अंक )

#### 1. Constitution, Acts and Rules

[3\*5= 15]

- 1.1 Constitution of Nepal (2072)
- 1.2 Industrial Policy, 2067
- 1.3 Industrial Enterprise Act, 2073
- 1.4 Industrial District Management Limited Electricity Regulation, 2059 (First Amendment, 2074)
- 1.5 Electricity Regulatory Commission Act, 2074
- 1.6 Electricity Act, 2049 and Regulation, 2050
- 1.7 Public Procurement Act, 2063 and Regulation, 2064 (Amended)
- 1.8 Corruption Control Act, 2059



# औद्योगिक क्षेत्र व्यवस्थापन लिमिटेड

(नेपाल सरकारको स्वामित्व भएको)

प्राविधिक सेवा, इन्जिनियरिङ्ग समूह/ईलेक्ट्रीकल उपसमूह ईलेक्ट्रिकल इन्जिनियर तह-७ पदको  
खुला तथा आन्तरिक प्रतियोगितात्मक लिखित परीक्षाको पाठ्यक्रम

2. **Electricity and Industrial Development in Nepal** [2\*5= 10]
  - 2.1 History of power and industrial 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 Industrial District Management Limited: objective, functions, corporate structure, achievement and challenges
  - 2.4 Concept of Industrial District Management Limited Restructuring in federal context
  - 2.5 Salient 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 and 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



# औद्योगिक क्षेत्र व्यवस्थापन लिमिटेड

(नेपाल सरकारको स्वामित्व भएको)

प्राविधिक सेवा, ईन्जिनियरिङ्ग समूह/ईलेक्ट्रीकल उपसमूह ईलेक्ट्रिकल इन्जिनियर तह-७ पदको  
खुला तथा आन्तरिक प्रतियोगितात्मक लिखित परीक्षाको पाठ्यक्रम

## द्वितीय पत्र: सेवा सम्बन्धी

Section: A

[5x10=50]

### 1. ELECTRICAL MACHINES

- Magnetic circuits: Flux linkage, inductance and energy; magnetic materials and their properties; magnetically induced emf and force; AC operation of magnetic circuits; hysteresis and eddy current losses.
- Transformers: Equivalent circuits; losses and efficiency; efficiency curves; energy efficiency; regulation; grounding; transformer connections; parallel operation; overloading capacity; temperature rise; auto-transformer, distribution transformers and instrument transformers.
- DC Machines: Working principles; types; operating characteristics; armature reaction; losses and efficiency; applications, starting and speed control of DC motors.
- Synchronous machines: Working principles; operating characteristics; losses and efficiency; steady state and transient equivalent circuits; excitation system and requirement, governor principle; parallel operation; hunting.
- Induction Machines: Working principles; operating characteristics of motoring and generating mode; losses and efficiency; equivalent circuits; starters; speed control and motor selection.

### 2. GENERATION

- Hydroelectric Power Plants: Merits and demerits; site selection; classification; elements of hydroelectric power plant and schematic layouts; different types of water turbines; efficiency curves; selection of water turbines; essential features of hydroelectric alternators; choice of size and number of generating units; auxiliaries in hydroelectric plant; Nepalese power plants, their types, salient features and locations.
- Diesel Electric Power Plants: Merits and demerits; application; site selection; elements of a diesel plant and its schematic arrangement; performance and thermal efficiency.
- Non-conventional method of power generation: Micro hydro, solar photovoltaic, wind and geothermal method of power generation and their importance.
- Concept of load curve; load duration curve; mass curve; demand factor; plant factor; utilization factor and plant use factor; significance of load factor and diversity factor in generation planning.

### 3. POWER ELECTRONICS

- Power electronics devices; Diode, power transistors, MOSFET, thyristors, GTO, IGBT
- Rectifiers; uncontrolled and controlled rectifiers, operation with inductive loads, harmonic filtering
- Inverters; voltage source and current source inverters, harmonic filtering
- DC choppers; cyclo-converters; AC voltage controllers
- Introduction to HVDC lines; advantages and applications

### 4. TRANSMISSION AND DISTRIBUTION

- Transmission: Choice of voltage; conductor size; insulators used in overhead lines; vibration dampers; conductor configuration; clearances; span lengths; sag-tension calculation; pole/tower types; right of way;
- Line parameters computations, Performance of short, medium and long transmission lines; ABCD constants; surge impedance loading, Ferranti effect ,



# औद्योगिक क्षेत्र व्यवस्थापन लिमिटेड

(नेपाल सरकारको स्वामित्व भएको)

प्राविधिक सेवा, ईन्जिनियरिङ्ग समूह/ईलेक्ट्रीकल उपसमूह ईलेक्ट्रिकल इन्जिनियर तह-७ पदको  
खुला तथा आन्तरिक प्रतियोगितात्मक लिखित परीक्षाको पाठ्यक्रम

- c. Corona phenomenon: Factors affecting corona and its disadvantages; corona loss, audible noise and radio interference;
- d. Inductive interference between power and communication lines
- e. Distribution Systems: Distribution feeders; conductor size; route selection; pole types; distribution substations; bus bar schemes; power factor correction; distribution system protection devices; distribution system reliability indices; transformer oil; consumer supply connection; metering system.

## 5. POWER SYSTEM ANALYSIS

- a. Load flow studies: Bus classification; load flow equations; Gauss Seidel and Newton Raphson methods of load flow solutions.
- b. Voltage control: Necessity of voltage control; methods of voltage control.
- c. Fault calculations: symmetrical and unsymmetrical faults; symmetrical components; sequence impedances; short circuit current calculations.
- d. Steady state, transient and dynamic stability; maximum steady state power flow; swing equation; equal area criterion; critical clearing angle; factors affecting transient stability, transient stability enhancements.

## Section: B

[5x10=50]

## 6. SWITCHGEAR AND PROTECTION

- a. Fundamentals of switch, isolators, fuse, MCB, MCCB, RCCB, RCCBO
- b. Types of protective relays; working principle and application, electromagnetic, static and digital relays
- c. Protection of generators, transformers and transmission and distribution lines;
- d. Characteristics of ACB, OCB, VCB, SF<sub>6</sub> and their applications;
- e. Over voltage computations, Protection against over voltage and lightning , surge arrestors
- f. Substations; classification; indoor and outdoor substations; selection and location of site; bus bar arrangements; substation switchgear; substation earthing.

## 7. SAFETY ENGINEERING

- a. Physical effects of electric shock, first aid requirements after electrical accidents, safety and precaution; safety rules and regulation;
- b. Safety tools and devices for electricity, live line maintenance and precautions
- c. Earthing and shielding techniques; earth resistance and resistivity measurement.
- d. Fire hazards; fire fighting techniques and equipment;

## 8. ELECTRICAL ENGINEERING BASICS:

- a. Electric charge and current, direct and alternating currents, electric voltage, Potential difference, power and energy
- b. Ohm's Law, Kirchhoff's Law; Star/ Delta and Delta / Star transformation;
- c. Network theorems; superposition theorem, maximum power transfer theorem, Thevenin's theorem and Nortons's theorem
- d. Inductance and Capacitance in AC circuits; voltage and current relations in circuit elements, equivalent inductance and capacitance computations.



# औद्योगिक क्षेत्र व्यवस्थापन लिमिटेड

(नेपाल सरकारको स्वामित्व भएको)

प्राविधिक सेवा, ईन्जिनियरिङ्ग समूह/ईलेक्ट्रीकल उपसमूह ईलेक्ट्रिकल इन्जिनियर तह-७ पदको  
खुला तथा आन्तरिक प्रतियोगितात्मक लिखित परीक्षाको पाठ्यक्रम

- e. AC analysis:, concept of phase difference, apparent, active and reactive power, complex power, power triangle, power factor, resonance in AC circuits
- f. Three phase systems; balanced and unbalanced systems, voltage current relations and computation of power in three phase systems
- g. Fundamentals of energy audit and efficient electrical energy system

## 9. ELECTRICAL NETWORK ANALYSIS

- a. The Laplace Transform in Circuit Analysis; Circuit Analysis in the s-domain
- b. The Transfer Function, Partial Fraction Expansions, the Convolution Integral
- c. Transients in electrical circuits; natural and step response of RL and RC and RLC Circuits
- d. Operational Amplifiers; Operational Amplifier Concepts, Inverting and Non-inverting Amplifier Circuit, The Difference Amplifier, zero crossing detectors
- e. Two port networks, reciprocity theorems

## 10. INSTRUMENTATION AND CONTROL

- a. Electrical measurements: Classification, working and applications of indicating, recording and integrating instruments for electrical measurements, Analog-digital and Digital-analog converters, precision and error
- b. Sensors and transducers: Sensors and transducers for speed, position, fluid flow and temperature
- c. Automatic feedback control system; time and frequency response of first and second order system, pole zero concept, stability criterion, root locus, and bode plots
- d. PID Controller; controlling the transient response and steady state error.

.....END.....