

चिलिमे जलविद्युत कम्पनी लिमिटेड

प्राविधिक सेवा, ईलेक्ट्रिकल/मेकानिकल समूह, तह-९, केन्द्र प्रमुख पदको
प्रतियोगितात्मक लिखित परीक्षाको पाठ्यक्रम ।

१. शैक्षिक योग्यता: चिलिमे जलविद्युत कम्पनी लिमिटेड कर्मचारी सेवा शर्त विनियमावलीमा व्यवस्था भए अनुसार ।
२. लिखित परीक्षाको विषय, पूर्णाङ्क, परीक्षा प्रणाली, प्रश्न संख्या, अंकभार र समय निम्नानुसार हुनेछ ।

पत्र	विषय	पूर्णाङ्क	परीक्षा प्रणाली	हल गर्नुपर्ने प्रश्न संख्या	प्रति प्रश्न अंकभार	समय
प्रथमपत्र	सेवा सम्बन्धी	५५	विषयगत	छोटो उत्तर	५	२ घण्टा
				लामो उत्तर	३	
द्वितीयपत्र	व्यवस्थापकीय ज्ञान	३०	विषयगत	छोटो उत्तर	३	१ घण्टा
				लामो उत्तर	१	

३. प्रथम र द्वितीयपत्रको परीक्षा २ पटक गरेर हुनेछ । प्रथम पत्रको परीक्षा सकिएपछि द्वितीयपत्रको परीक्षा तत्काल हुनेछ ।
४. परीक्षामा कालो/नीलो मसी मात्र प्रयोग गर्नुपर्ने छ ।
५. प्रत्येक पत्रको न्यूनतम ४० प्रतिशत उत्तीर्णाङ्क हुनेछ ।
६. परीक्षाको माध्यम नेपाली वा अंग्रेजी भाषा हुनेछ ।
७. सामान्यतः प्रत्येक शिर्षकको अंकभार तोकिए बमोजिम हुनेछ ।

प्रथमपत्र – सेवा सम्बन्धी [55]

Part-A र Part-B मा ५ अंकको ३, ३ र १० अंकको २, २ प्रश्न हुनेछन् र सो मध्ये दुवै Part बाट ५ अंकको जम्मा ५ प्रश्न र १० अंकको जम्मा ३ प्रश्नको उत्तर दिनु पर्नेछ ।

PART-A (ELECTRICAL)

1. MODERN TRENDS IN ELECTRIC UTILITIES: [5×1]

Private participation in hydropower development, Energy wheeling, Energy pool market, Power purchase agreement, Recent trends in power sector reform, Unbundling and Power system deregulation.

2. ELECTRICAL MACHINES: [10×1]

- **Transformers:** Construction, Equivalent circuits, Performance, Connections, Grounding, Current harmonics, Parallel operation, Overloading capacity, Temperature rise.
- **Synchronous Machines:** Construction, Steady state and transient equivalent circuits, Performance, Excitation system and requirements, Under excitation & Over excitation operating modes, Parallel operation and hunting.
- **Induction Machines:** Construction, Equivalent circuits, Performance, Starter and speed control of induction motor, Induction generator controllers and harmonics.
- **DC Machines:** Construction, Performance, Armature reaction, Starter and speed regulation of motors, Applications in power plant.

3. POWER PLANTS: [5×1]

Hydropower potential, Optimal development and scheduling of hydropower potential of a river system, Comparative study of different types of hydropower plant, Water turbines, Flow regulations, Reservoir operation, Environmental impact of hydropower development, Principle, layouts, costs, environmental impacts of steam, gas, nuclear, wind and solar power plants, black starting of power plant.

4. POWER SYSTEM OPERATION: [10×1]

- **Control and protections:** Faults in power system and their calculation, Components of power system protection, Isolators/Disconnecting switches, contactors, Types and characteristics of circuit breakers and protective relays, Automatic enclosure, Protection of generators, transformers and transmission/distribution lines, Lightning protection, Governor's principle and characteristics.
- **Power system stability:** Steady state, dynamic and transient stability, Equal area criterion, Swing equation for a multi-machine system, Steady-state stability implications.
- **Substation:** Power Station, Switching Substation, Distribution substations, Bus bar schemes, Power factor correction, Protection coordination, reliability indices.
- **Conversion:** AC to DC and DC to AC conversions, Harmonic filtering, Switched mode power supplies.

5. ELECTRIC ENERGY SYSTEM MANAGEMENT: [5×1]

- **Load dispatching:** Economic load dispatch, requirements, tools and role of dispatcher, Rationale and tools of demand side management.
- **Quality of electricity:** Supply quality parameters, Effect of quality on equipment and Application standards.

PART-B (MECHANICAL)**1. HYDROPOWER ENGINEERING [5×1]**

- Measurement of pressure, flow, temperature, speed, voltage, current, power and energy.
- Types of turbines and pumps.
- Selection criteria of turbines and pumps for the site condition and system.
- Characteristics of different types of pumps and their efficiency curves.
- Arrangement of turbines-generator (horizontal or vertical) and their merits and demerits.
- Alignment technique and procedures of turbines and pumps.
- Different types of bearings and applications.

2. WATER TURBINES AND GOVERNORS [10×1]

- Different types of Turbines and their parts.
- Cavitation in turbines, cavitation factor and methods used to avoid cavitation.
- Draft tube and its function.
- Efficiency, Characteristics curves.
- Wear and tear of turbine.
- Types of governors used in hydropower plant; their working principles, characteristics, applications and maintenance.

3. HYDRO-MECHANICAL EQUIPMENT [5x1]

- Types of penstock pipes, their uses and their design criteria.
- Types, selection and design criteria of gates and hoisting mechanism used in hydropower plant.
- Purpose, types and uses of inlet valve.
- Types, uses of cranes.

4 SAFETY ENGINEERING [5x1]

- Safety rules and regulations for handling explosive, compressive gases and flammable substance.
- Physical effects of electric shocks, safety and precaution, safety tools and devices, live line maintenance and precautions.
- First aid requirement after shock treatment.
- Fire hazards: firefighting techniques and equipment.
- Noise hazards: sources, control and effect on health.

5. MAINTENANCE MANAGEMENT [10x1]

- Types of maintenance systems: breakdown, preventive, proactive.
- Failure analysis.
- Conditioning monitoring maintenance planning and control.
- Equipment and tools used in maintenance.
- Maintenance of turbine, pump and bearings.
- Maintenance management of equipment in hydropower plant.
- Maintenance management of equipment in diesel power plant.
- Maintenance management of construction equipment.

द्वितीयपत्र – व्यवस्थापकीय ज्ञान [30]

क) छोटी उत्तर [15]

1. LEGAL PROVISIONS FOR POWER SECTOR DEVELOPMENT: [5x1]

Hydropower Development policy, 2058, Water Resources Act, 2049, Water Resources Regulations, 2050, Electricity Act, 2049, Electricity Regulation, 2050, Nepal Electricity Authority Act, 2041, Environment Protection Act, 2053, Environment Protection Regulation, 2054, Electricity Pilferage Control Act, 2058, Electricity Pilferage control regulation, 2059, Electricity Tariff Fixation Regulation 1993, Land Acquisition Act.2034, Industrial Policy 2049.

2. ENGINEERING ECONOMICS: [5x1]

Cash flow analysis, Project evaluation indicators, Cost benefit ratio, IRR, Payback period, Criteria for capital investment decision, Risk analysis, Taxation system in Nepal, Energy tariff and regulatory issues.

3. **ORGANIZATION AND PROJECT MANAGEMENT: [5x1]**

Internal Organization, Motivation, Leadership, control, coordination and team work, Corporate planning and strategic management, Management Information System, Job description, Job analysis, Performance appraisal, Auditing and inventory control, Personnel Management, Familiarization with public procurement guidelines and standards, Preparation of Contract documents, specifications, condition of contract and other contractual procedures.

Project Planning and Scheduling: Network models, CPM/PERT, Manpower leveling, Material scheduling, Project preparation for implementation and justification of the project.

Project monitoring and control: System of control, Project control cycle, Feedback control systems, Cash control.

Capital Planning and Budgeting: Capital planning procedures, Preparation of operating budgets, fixed and flexible budget, budgetary control.

ख) समस्या समाधान [15x1]

व्यवस्थापकीय कार्यसँग सम्बन्धित कुनै एउटा समस्या दिइनेछ । प्रचलित ऐन नियमको परिधि र अवस्था समेतलाई विचार गरी दिइएको समस्याको निम्न आधारमा उपयुक्त समाधान र सुझाव प्रस्तुत गर्नु पर्नेछ ।

- (१) समस्याका खास खास कारणहरू दर्शाउने ।
- (२) समस्या समाधानका लागि सुझावहरू दर्शाउने ।
- (३) प्रस्तुत सुझावहरू कार्यान्वयन गर्दा त्यसबाट पर्न सक्ने सकारात्मक प्रभावहरू उल्लेख गर्ने ।

द्रष्टव्य: पाठ्यक्रममा राखिएका संविधान, ऐन, नियम र विनियमहरू परीक्षा हुनु भन्दा ३ महिना अगाडिसम्म संशोधन वा खारेज भई त्यसको सट्टा प्रचलनमा रहेकालाई सोही अनुरूप पाठ्यक्रममा समावेश भएको मानिने छ ।

