

चिलिमे जलविद्युत कम्पनी लिमिटेड

प्राविधिक सेवा, ईलेक्ट्रिकल समूह, तह-८, सहायक प्रबन्धक (बरिष्ठ ईलेक्ट्रिकल इन्जिनियर) पदको प्रतियोगितात्मक लिखित परीक्षाको पाठ्यक्रम ।

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

पत्र	विषय	परीक्षा प्रणाली	हल गर्नुपर्ने प्रश्न संख्या	प्रति प्रश्न अंकभार	पूर्णाङ्क	समय	
प्रथमपत्र	सेवा सम्बन्धी	विषयगत	छोटो उत्तर	५	५	५५	२ घण्टा
			लामो उत्तर	३	१०		
द्वितीयपत्र	व्यवस्थापकीय ज्ञान	विषयगत	छोटो उत्तर	३	५	३०	१ घण्टा
			लामो उत्तर	१	१५		
अन्तर्वार्ता					१५		

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

प्रथमपत्र – सेवा सम्बन्धी [55]

1. BASIC ELECTRICAL ENGINEERING [5]

- Conducting, insulating and magnetic materials, Electric charge and current, Potential difference, power and energy
- Series parallel and mixed DC circuits, Star/ Delta and Delta / Star transformation
- Network theorems; superposition theorem, maximum power transfer theorem, Thevenin's theorem and Nortons's theorem
- Inductance and Capacitance in AC circuits; voltage and current relations in circuit elements, equivalent inductance and capacitance computations, reactance and impedance
- AC analysis: concept of phase difference, active and reactive power , complex power, power triangle, power factor, resonance in AC circuits
- Three phase systems; balanced and unbalanced systems, voltage current relations and computation of power in three phase systems

2. ELECTRIC CIRCUIT THEORY AND AUTOMATION [5]

- The Transfer Function, Partial Fraction Expansions, the Convolution Integral
- Transients in RL, RC and RLC electrical Circuits
- Two port networks parameters, symmetrical and reciprocal networks

- Operational Amplifiers; Operational Amplifier Concepts, Inverting and Non-inverting Amplifier Circuit, The Difference Amplifier, zero crossing detectors
- Automatic feedback control system; Sensors and transducers, time and frequency response, stability criterion, root locus, PID Controller
- Concept of PLC

3. POWER ELECTRONICS: [5]

- Power electronics devices; Diode, power transistors, MOSFET, thyristors, GTO, IGBT
- DC-AC and AC-DC converters Sinusoidal PWM, dynamic model and control of PWM inverters
- AC-AC Converters: Single-phase AC regulator; Three-phase AC regulators, Single-phase and three-phase Cyclo-converters
- Basics of Flexible AC transmission systems (FACTS) and HVDC lines

4. ELECTRICAL MACHINES: [10]

- Transformers: Equivalent circuits, short circuit and open circuit tests, Losses and efficiency, Voltage regulation, three phase connections, Parallel operation, Temperature rise, Auto-transformers, Instrument transformers.
- Synchronous Machines: Operating Characteristics, Losses and efficiency, Steady state and transient equivalent circuits, operation for lagging, leading and unity power factor load, Parallel operation and hunting
- Induction Machines: Equivalent circuits, torque slip characteristics, Losses and efficiency, Starter and speed control of induction motor, Induction generator controllers and harmonics
- DC Motors: series, shunt and separately excited DC motors, Losses and efficiency, Starting and speed regulation of motors, Applications.

5. POWER PLANT [5]

- Hydroelectric Power Plants: Site selection; classification; elements of hydroelectric power plant and schematic layouts; selection of water turbines; essential features of hydroelectric alternators; choice of size and number of generating units; Nepalese power plants, their salient features and locations; Governing mechanism
- Diesel Electric Power Plants: Merits and demerits; applications; elements of a diesel plant and its schematic arrangement; performance and thermal efficiency.
- Renewable energy technology: Micro hydro, solar photovoltaic, and wind energy generation, grid interconnection of renewable energy
- Plant factor, significance of load factor and diversity factor in generation planning.

6. POWER TRANSMISSION AND DISTRIBUTION LINES [10]

- Performance of short, medium and long transmission lines; ABCD constants; surge impedance loading, Ferranti effect,
- Transmission Systems: Choice of voltage, Surveying, Route selection, Right of way, span and ground clearance, Sag and Tension Computations

- Corona phenomenon: Factors affecting corona and its disadvantages; corona loss, audible noise and radio interference;
- Distribution system layouts, Radial, loop and ring distribution system, primary and secondary voltage selection criterion, overhead and underground distributions
- Urban and rural distribution; scope of renewable energy for rural electrification
- Concept of load curve; load duration curve; demand factor; Small area load forecasting methods, loss reduction and voltage profile improvement in distribution system
- Leakage resistance and Dielectric loss computations in cables

7. POWER SYSTEM ANALYSIS [10]

- Load flow study: G-S, N-R, decoupled and DC Load flow methods
- Symmetrical and unsymmetrical faults in power system, Fault calculations in integrated power system
- Power system stability: Steady state, dynamic and transient stability, Equal area criterion, Swing equation for a multi-machine system, stability enhancement techniques
- Steady state and transient Over voltages in power systems, insulation coordination
- Load dispatching: Principle of economic load dispatch, requirements, tools and role of dispatcher, Rationale and tools Of demand side management.
- Real power/frequency balance, Reactive power/ Voltage balance

8. SWITCHGEAR AND PROTECTION [5]

- Types of protective relays; working principle and application, electromagnetic, static and digital relays
- Protection of generators, transformers and transmission and distribution lines;
- Characteristics of ACB, OCB, VCB, ABCB and gas circuit breakers and their applications;
- Protection against over voltage and lightening, surge arrestors
- Substations; classification; indoor and outdoor substations; selection and location of site; bus bar arrangements; substation switchgear, substation earthing.
- Protection Coordination

द्वितीयपत्र – व्यवस्थापकीय ज्ञान [30]

1. TRENDS IN POWER SECTOR DEVELOPMENT [15]

- History of power development in Nepal, Energy demand supply trends, Challenges and prospects of hydropower development, Major projects under implementation and planning, cause of load shedding and its remedies, Demand side management, Grid code.
- Role of Government institutions and [PPS in power sector development, Coordination between stakeholders in power sector,
- NEA Subsidiary & Associate Companies

- Role of Chilime hydropower company in power sector development
- Chilime hydropower company rules and regulations
- Knowledge of Nepalese power transmission system: voltage levels and length; existing and proposed export-import links for power exchange with India and other nations
- Concept of Nepalese power system deregulation in federal context
- Recent national/international practices in power sector reform; Energy wheeling charge, Energy pool market, Availability based tariff

2. LEGAL PROVISIONS FOR POWER SECTOR DEVELOPMENT: [5]

- Hydropower Development policy, 2058,
- Water Resources Act, 2049,
- 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 regulation act-2074
- Familiarization with IEC test standards

3. ENGINEERING ECONOMICS: [5]

- The economic variables in technical selections
- Disbursement scheduling and budgeting; Capital planning procedures, Preparation of operating budgets, fixed and flexible budget, budgetary control.
- Cash flow analysis, Project evaluation indicators, IRR, Payback period and others Criterion Choosing the best alternative
- Incremental Analysis, Sensitivity & breakeven analysis
- Risk analysis, Inflation & price change, Taxation system in Nepal, Energy tariff and regulatory issues

4. ORGANIZATION AND PROJECT MANAGEMENT [5]

- Concept of Management, Internal Organization
- Motivation, Leadership, control, coordination and team work, Decision making, Corporate planning and strategic management,
- Network models, CPM/PERT, Manpower leveling, Material scheduling, Project preparation for implementation and justification of the project.
- Management Information System

- Corporate planning and strategic management, Job description, Job analysis, Performance appraisal, Auditing and inventory control
- Familiarization with procurement guidelines and standards of World Bank, ADB, PPMO and other development partners
- Preparation of Contract documents, specifications, condition of contract and other contractual procedures.

- द्रष्टव्यः -** पाठ्यक्रममा राखिएका संविधान, ऐन, नियम र विनियमहरू परीक्षा हुनु भन्दा ३ महिना अगाडिसम्म संशोधन वा खारेज भएकालाई सोही अनुरूप पाठ्यक्रममा समावेश भएको मानिने छ ।
- लिखित परीक्षा उत्तीर्ण हुनेहरूको मात्र अन्तरवार्ता हुनेछ ।

