विद्युत नियमन आयोग,

इन्जिनिरिङ सेवा, इलेक्ट्रिकल समूह, तह ९, सहनिर्देशक पदको

खुला/आन्तरिक प्रतियोगितात्मक परीक्षाको पाठ्यक्रम

पाठ्यक्रम योजनालाई निम्नानुसार दुई चरणमा विभाजन गरिएको छः

प्रथम चरणः	लिखित परीक्षा	पूर्णाङ्कः- २००
द्वितीय चरणः	अन्तर्वार्ता	पूर्णाङ्कः- ३०

परीक्षा योजना (Examination Scheme)

१. प्रथम चरण - लिखित परीक्षा **पूर्णाङ्क :- २००**

पत्र	विषय	पूर्णाङ्क	उत्तीर्णाङ्क	खण्ड	परीक्षा प्रणाली	प्रश्न संख्या	अङ्क भार	समय
प्रथम	शासकीय व्यवस्था, व्यवस्थापन तथा विद्युत नियमन सम्बन्धी	१००	४०	क	छोटो उत्तर आउने प्रश्न	८	५	३ घण्टा
				ख	लामो उत्तर आउने प्रश्न	६	१०	
द्वितीय	सेवा सम्बन्धी	१००	४०	क	तर्कयुक्त विश्लेषणात्मक प्रश्न	३	१०	३ घण्टा
					समस्या समाधान प्रश्न	१	२०	
				ख	तर्कयुक्त विश्लेषणात्मक प्रश्न	३	१०	
					समस्या समाधान प्रश्न	१	२०	

२. द्वितीय चरण - अन्तर्वार्ता **पूर्णाङ्क :- ३०**

विषय	पूर्णाङ्क	परीक्षा प्रणाली
अन्तर्वार्ता	३०	मौखिक

द्रष्टव्यः

१. प्रथम र द्वितीय पत्रको लिखित परीक्षा छुट्टाछुट्टै हुनेछ ।

२. लिखित परीक्षाको माध्यम भाषा नेपाली वा अंग्रेजी अथवा नेपाली र अंग्रेजी दुवै हुनेछ ।

३. विषयगत प्रश्नहरूको हकमा एउटा लामो प्रश्न वा एउटै प्रश्नका दुई वा दुई भन्दा बढी भाग (Two or more parts of a single question) वा एउटा प्रश्न अन्तर्गत दुई वा बढी टिप्पणीहरू (Short notes) सोध्न सकिनेछ।

४. विषयगत प्रश्न हुने पत्र/विषयका प्रत्येक खण्डका लागि छुट्टाछुट्टै उत्तरपुस्तिकाहरू हुनेछन्। परीक्षार्थीले प्रत्येक खण्डका प्रश्नहरूको उत्तर सोही खण्डको उत्तरपुस्तिकामा लेख्नुपर्ने छ।

५. यस पाठ्यक्रम योजना अन्तर्गतका पत्र-विषयका विषयवस्तुमा जुनसुकै कुरा लेखिएको भए तापनि पाठ्यक्रममा परेका कानुन, ऐन, नियम, विनियम तथा नीतिहरू परीक्षाको मिति भन्दा ३ महिना अगाडि (संशोधन भएका वा संशोधन भई हटाइएका वा थप गरी संशोधन भई) कायम रहेकालाई यस पाठ्यक्रममा परेको सम्झनु पर्दछ।

६. प्रथम चरणको परीक्षाबाट छनौट भएका उम्मेदवारलाई मात्र द्वितीय चरणको परीक्षामा सम्मिलित गराइनेछ ।

७. **पाठ्यक्रम स्वीकृत मिति : २०८२/०१/०८**

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खुला/आन्तरिक प्रतियोगितात्मक परीक्षाको पाठ्यक्रम

प्रथम पत्र

शासन, व्यवस्थापन तथा नियमन सम्बन्धी

खण्ड (क): शासकीय प्रबन्ध, व्यवस्थापन तथा व्यावसायिकता सम्बन्धीः ४० अङ्क

1. Governance and Public Management

1.1 The constitution of Nepal (parts 1, 3, 4 & 5, and schedules)
1.2 Governance : definition, functions, principles and characteristics
1.3 Federal, provincial and local level governance of Nepal
1.4 Concept and basic elements of public administration
1.5 Public policy: formulation, implementation, monitoring and evaluation
1.6 Financial administration: budget preparation, implementation, monitoring and evaluation
1.7 Diversity management

2. Management and Basics of Financial Analysis

2.1 Concept of management
2.2 Significance of leadership, motivation, teamwork, decision making, control and coordination in management
2.3 Corporate planning and strategic management
2.4 Corporate social responsibility
2.5 Information management system
2.6 Project management
  2.6.1 Project planning and scheduling: network diagrams, CPM/PERT, manpower planning, resource scheduling, project preparation for implementation and justification
  2.6.2 Project monitoring and control: systems of control, project control cycle, feedback control systems, cash control
  2.6.3 Capital planning and budgeting: capital planning procedures, preparation of operating budgets, fixed and flexible budget, budgetary control
2.7 Financial analysis: methods of financial analysis such as benefit cost ratio, internal rate of return (IRR), net present value, payback period, minimum attractive, return on equity

3. Development Management

3.1 Concept of development administration
3.2 People participation in development
3.3 Planned development in Nepal (ref. 16th Five Year Plan)
3.4 Sustainable development
3.5 Public private partnership
3.6 Foreign direct investment

4. Ethics and Professionalism

4.1 Essence, determinants and dimensions of ethics
4.2 Human values
4.3 Ethical issues in public service delivery and utilization of public funds
4.4 Challenges of corruption and corruption control mechanism
4.5 Accountability, responsibility and authority
4.6 Dispute settlement mechanism, negotiation skills
4.7 Compliance monitoring

4.8 The foundational values of public service – integrity, impartiality, dedication, tolerance and compassion

4.9 Time management, resource management, technology management, team management, conflict management, stress management, risk management, participative management, disaster management

खण्ड (ख): सेवा तथा विद्युत नियमन सम्बन्धी : ६० अङ्क

5. Evolution of Nepal's Electricity Sector

5.1 Current scenario: electricity generation, transmission, distribution, demand and supply

5.2 Role of Department of Electricity Development, Ministry of Energy, Water Resources and Irrigation, Water and Energy Commission Secretariat, Electricity Regulatory Commission, Nepal Electricity Authority, Rastriya Prasaran Line Grid Company Limited (RPGCL), Cross boarder Power Transmission Line Co. (e.g. Dhalkebar – Muzaffarpur), Alternate Energy Promotion Center, Investment Board Nepal etc.

5.3 Investment model for hydropower development

5.4 Concept of NEA Restructuring in federal context, Operational Performance

5.5 Various models of Investment for hydropower development

5.6 Transmission System Development Plan of Nepal, RPGCL, GON

6. Electricity Market

6.1 Market Principles, Independent System Operator, Distribution System Operator, Power Balancing, Market Participants, Power Markets, Market Rules, Bidding, Trading, Settlement System, Locational Marginal Pricing, Transmission pricing, Merchant Power, Differential Electricity, Congestion Management, Ancillary Services

6.2 Energy Banking

6.3 Concept of Cross Border Energy Trade between Bangladesh, Bhutan, India and Nepal (BBIN) region

6.4 Understanding power market, Power Pool (e.g. Energy market of Thailand, Indian Electricity Market, South African Power pool, NORDIC Power pool)

6.5 Agreement between The Government of Nepal and The Government of The Republic of India on Electric Power Trade, Cross-Border Transmission Interconnection and Grid Connectivity

6.6 Memorandum of Understanding (MoU) between The Government of Nepal and The Government of The People's Republic of Bangladesh on Cooperation in the Field of Power Sector

7. Concept of Regulation and Regulatory Bodies

7.1 Necessity and Rationale for existence of independent regulator, history of regulation of electricity utility, global and regional trends in regulation, etc.

7.2 Electricity Regulatory Commission – roles and responsibilities and prospects

7.3 Tariff fixation procedures in Nepal – past and present, principles guiding the consumer tariff fixation

7.4 PPA Procedures and Generation Tariff Fixation

7.5 Stakeholder Relations and Public Hearing

7.6 Corporate Governance of Electricity Generation, Transmission, Trade and Distribution Utilities
7.7 Concept of Sub-legislation like directives, by-laws and circulars issued by regulatory bodies and significance
7.8 Methods of competition, efficiency, and economy in the activities of electricity industries

8. Related Legislations

8.1 Electricity Act, 2049 and Electricity Regulations, 2050
8.2 Electricity Regulatory Commission Act, 2074 and Electricity Regulatory Commission Regulation, 2075
8.3 Nepal Electricity Authority Act, 2041
8.4 Hydropower Development Policy, 2058
8.5 Green Hydrogen Policy, 2080
8.6 Consumer Protection Act, 2075
8.7 Foreign Investment and Technology Transfer Act, 2075
8.8 Public Procurement Act, 2063 and Regulation, 2064
8.9 Environment Protection Act, 2076 and Environment Protection Regulation, 2077
8.10 Good Governance (Management and Operation) Act, 2064 and Regulation, 2065
8.11 Public Private Partnership and Investment Act, 2075
8.12 National Energy Efficiency Strategy, 2075
8.13 ERC Financial Administration Bylaws, 2081
8.14 ERC Employee Administration Bylaws, 2081
8.15 ERC Five Years Roadmap, 2081-86

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द्वितीय पत्र

सेवा सम्बन्धी

खण्ड (क): ५० अङ्क

1. Power Plants and Electrical Machines

1.1 Hydroelectric power plants: selection of water turbines; essential features of hydroelectric alternators; choice of size and number of generating units; auxiliaries in hydroelectric plant, governor and its operating mechanism, island mode operation

1.2 Synchronous machines: construction, operating characteristics, steady state and transient equivalent circuits, excitation system and its requirements, PQ capability curve, parallel operation and synchronization to grid, synchronous condensers

1.3 Induction Generators: types, construction and operating principles, controllers for DFIG, harmonics generation, field of applications

1.4 Transformers: operating characteristics, losses and efficiency, voltage regulation, grounding, current harmonics, parallel operation, overloading capacity, temperature rise, auto-transformers for extra high voltage system, instrument transformers operation, selection and applications

1.5 Thermal power plant: efficiency, merit and demerit, power plant control, concept of turbo alternators

1.6 Nuclear power plant: efficiency, selection of site, constituents of nuclear power plant and layout, pollution from the plants

1.7 Gas power plant: efficiency, element of simple gas turbine power plant, operation and plant control, plant layout

2. Power System Analysis

2.1 Performance analysis of transmission lines, Y and Z buses formation, Fault calculations using Z-bus and by symmetrical component method, fault location in transmission and distribution systems

2.2 Transient stability: equal area criterion, Swing equation for a multi-machine system, stability enhancement techniques

2.3 Insulation coordination, different types of over voltages and their protection

3. Distribution System and Power Supply Quality

3.1 Distribution system layouts, UG/ overhead, rural/ urban distribution

3.2 Load forecasting, small area load forecasting methods, techniques, distribution transformer selections

3.3 Distribution automation; distribution network reconfiguration and other intelligent distribution, control methods, optimal capacitor placements in primary distribution systems

3.4 Power quality indicators: definition of power quality, voltage and frequency fluctuations, short and long duration voltage variations, waveform distortion and harmonics

3.5 Power quality issues: power acceptability curves, options to address power

4. Power Sector Development Power Development Agreements and MOUs

4.1 Role of Government institutions involved in power sector development, Role of IPPs, Major projects under implementation and planning; Importance of power exchange agreement with India, Scope of power exchange with other countries, Cross border/regional power trade, Coordination between stakeholders in power

sector, Scope for export-oriented development of power sector, Legal and economic aspects for cross border transactions

4.2 Understanding of existing MOUs for development of Hydropower project (eg, Upper Karnali, Arun 3 hydro projects)

4.3 Elements of project development Agreement (PDA) for Private sector investment promotion (e.g. model PDA, Upper Karnali, Arun3, Trishuli 3 Hydro power project)

5. Electrical Energy System Management

5.1 Load dispatching: Principle of economic load dispatch, requirements, tools and role of dispatcher, Rationale and tools of demand side management

5.2 Economic analysis and control of power utility, Electrical load forecasting, Generation scheduling, Technical and Economic issues of generation and energy dispatch, Grid Code

5.3 Optimal load flow, fixed variable state variables, control variables, equality and inequality constraints, solution techniques, PQ decoupling

5.4 Voltage stability, PQ capacity of transmission line, voltage collapse, Concept of frequency stability

5.5 Grid code: Power evacuation standards considering line congestion, stability and security criterion, guideline for preparing

5.6 Consumer Side Management in Smart Grids: Demand Side Management in Smart Grids, Price-based Demand side integration implementations (Time of use, Real-time pricing, Critical peak pricing), Incentive-based DSI implementations

6. Grid Operation

6.1 Management of Active/Reactive power in complex system-challenges and opportunities for management

6.2 Power system stability –Issues and challenges

6.3 Control and protection: Importance, trends and challenges in complex electrical systems

खण्ड (ख) : ५० अङ्क

7. Power System Reliability and Risk Assessment

7.1 Evolution of power system reliability: engineering aspect, economic perspective; reliability evaluations of simple and complex system; Application of Binomial distribution and Markov process in reliability evaluation; Frequency and duration concepts, state space models.

7.2 Concepts of Hierarchical Level (HL); Generation Capacity planning; concepts and applications of LOLP, LOLE, EENS, ECOST, IEAR

7.3 Composite reliability evaluation: methods; common indices used; impact of tie line capacity and reliability

7.4 Distribution system reliability: evaluation techniques, customer-oriented indices, load and energy-oriented indices, evaluation of radial systems, effect of disconnect switches, effect of protection failure, effect of transformer load

7.5 Reliability and its compliance in deregulated power system: challenges and governance, international perspectives, current state in Nepal, challenges and opportunities

8. Safety, Reliability and Quality Concerns

8.1 Concept and metrics of reliability [System Average Interruption Duration Index (SAIDI), Customer Average Interruption Duration Index (CAIDI), System Average Interruption Frequency Index (SAIFI)] and impact of lower reliability
8.2 Quality of electricity supply
8.3 Customer Service Standards and Industry Technical Standards

9. Electricity Economics and Planning

9.1 Electricity Demand Forecast report (2025-2040), WECS, GON
9.2 Nature of Planning in Electricity Sector & Hierarchy of Electricity Planning Models
9.3 Electricity Demand Forecasting: Electric Load Representation, Different Approaches for Forecasting, Short Term Demand Forecasting Models, Long Term Demand Forecasting Models
9.4 Electricity Demand Side Management: Economic Operation of Power System, Short-term Economic Dispatch, Unit Commitment, Mid-term Scheduling, Hydro-Thermal Scheduling
9.5 Generation Planning Techniques: Electricity Generation Technologies, Levelized bus-bar cost analysis
9.6 Screening Curve Analysis: Thermal and Hydropower Plants
9.7 Key Indices of Power System Reliability and their Calculations
9.8 Linear, Mix Integer and Dynamic Programming approach to Planning, Traditional Generation Expansion Planning Models, Integrated Resource Planning Models, Dealing with Uncertainties in Capacity Expansion Planning
9.9 Electricity Pricing Theory and Approaches: Objective of Electricity Pricing, Marginal Cost Pricing, Theory of Peak Load Pricing, Buyback rates of Electricity Produced by Independent Power Producers, Hedging
9.10 Performance Evaluation of Electric Utilities

10. Tariff Determination and Financial Analysis

10.1 Tariff, types of tariffs, wheeling charge, load dispatch center charge, cross subsidy surcharge, determination of generation, transmission and distribution tariffs, objectives of tariff, concept of cost of supply and average billing rate
10.2 Factors affecting tariffs: Capital Expenditure, Interests on working capital, interest on loan, Debt Equity Ratio, Depreciation, Working Capital, Operating and Maintenance Expenditure, Royalty, Rate of Return, etc.
10.3 Methods of Tariff Determination: Cost of Service Regulation, Performance Based Regulation, Price Cap Regulation, Revenue Cap Regulation, Formula Rate Plans
10.4 Other terms related to financial analysis: Weighted Average Cost of Capital, Return on Equity, Return on Assets, Return on Capital Employed, market return, risk free rate, beta coefficient, sensitivity analysis, etc.
10.5 Cost Analysis

11. Contract Management and Bilateral Agreement

11.1 Concept of contract and its fundamental principles
11.2 Preparation of contract documents, specifications, condition of contract and other contractual procedures
11.3 Familiarization with Procurement guidelines and standards of World Bank & Asian Development Bank
11.4 International Standard Bidding Document, National Standard Bidding Document

11.5 Authorized Capital, Issued Capital, Paid Up Capital, Initial Public Offering and Final Public Offering, Bonus Share, Share Structures, Merger and Acquisition, Takeover, Transfer, Securities Board of Nepal, Office of Company Registration,

11.6 Article of Association, Memorandum of Association, Shareholder's Agreement

11.7 Settlement of Contract Disputes (mediation, arbitration and negotiation)

11.8 Elements of SAARC framework agreement on energy cooperation (electricity), 2014

11.9 Agreement between the government of republic of India on electric power trade, cross boarder transmission interconnection and grid connectivity