विद्युत नियमन आयोग,

इन्जिनिरिङ सेवा, हाइड्रोपावर 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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खुला/आन्तरिक प्रतियोगितात्मक परीक्षाको पाठ्यक्रम

द्वितीय पत्र

सेवा सम्बन्धी

खण्ड (क) : ५० अङ्क

1. Overview of Hydraulics, Hydrology and Sedimentation

1.1 Hydraulics

1.1.1 Boundary layers, flow in natural channels, uniform flow, steady flow, laminar and turbulent flow, open channels and closed conduits, Reynold's number, Froude's number and their usage

1.1.2 Hydraulic transients

1.1.3 Basic knowledge of hydraulic gradient, friction losses, water hammer, hydraulic jump and specific energy

1.1.4 Concept of head loss, friction loss, local loss, total head and net head

1.1.5 Bernoulli's equation and its application

1.2 Hydrology and Sedimentation

1.2.1 Basic knowledge of drainage area and its characteristics, rainfall and stream flow data, analysis of rainfall and stream flow data, determination of low flows and high flows

1.2.2 Methods and estimation of rain fall and run-off, Rainfall runoff correlation and rating curve, Velocity and discharge measurements, Stage discharge curve and its use

1.2.3 River discharge, methods of velocity and flow measurement, area capacity curve, rating curves, flow duration curves

1.2.4 Definition, type and usage of hydrographs, hydrograph analysis

1.2.5 Causes and occurrence of floods, flood hydrographs, flood estimates, flood frequency analysis, flood routing, recurrence interval and their role in planning

1.2.6 Definition and usage of probable maximum flood (PMF) and Probable Maximum Precipitation (PMP) in design of hydraulic structures

1.2.7 Basic knowledge of sedimentation and erosion process and factors affecting erosion, concepts of suspended and bed load transport, sediment data, measurement and their significance in development of hydropower projects

1.2.8 Sediment sampling

1.2.9 Estimates of sediment volume and its construction

2. Water Resources Planning and Planning of Power Projects

2.1 Water Resources Planning: Integrated Planning, Basin-wise Planning-, Short-, Medium- and Long-term Planning, Selection of Master Plan

2.2 Power market survey, Status of hydropower and other energy resources in Nepal

2.3 Power Plants

2.3.1 Hydropower plants, solar plants, other renewable energy plants

2.3.2 Development objectives, Production patterns and output profiles, Cost characteristics

2.4 Concepts and different phases of studies - Reconnaissance, Prefeasibility, Feasibility, Detailed Design

2.5 Concepts/principles of Environmental Studies i.e. Initial Environmental Examination (IEE) and Environmental Impact Assessment (EIA), in the Development of hydropower and transmission line projects

2.6 Hydrological and geological investigations in hydropower planning

2.7 Different types of hydropower projects/plants and their choice with respect to site condition and economy; Types of hydropower development/schemes (Run of the river, Peaking Run of the River, Storage, and Pump Storage),
2.8 Concept of multipurpose water resources development; Concept of River basin development and Integrated Water Resource Management
2.9 Cost of storage, Minimum dry weather flow, Consequences of short supplies, Cost of providing uniform regulated discharge
2.10 General concept of transmission lines and substation
2.11 Project implementation and management
2.12 Construction management
2.13 Operational optimization
2.14 Financial planning and risk mitigation

3. Optimization Study

3.1 Power demand and forecast
3.2 Definition and determination of potential and firm power, maximum power output, firm energy, surplus energy, seasonal energy, and average annual energy
3.3 General concept of load, load curve, capacity factor, load factor, and utilization factor
3.4 Power demand variation - daily, weekly, monthly, seasonal, and annual
3.5 Optimization of installed capacity, firm capacity of plant and dependable capacity, optimization algorithms, techniques
3.6 Role of different types of hydropower project in meeting power demand as per the load curve

4. Design of Hydropower projects

4.1 General layout of hydraulic structures
4.2 Water Retaining Structures, Spillways and Intake of Hydropower
4.2.1 Dam classification and their usage based on – functionality, acting forces, and construction material
4.2.2 Selection of dam based on – construction material, topography, and economy and purpose
4.2.3 Concrete Gravity Dams: Forces on gravity dams, their line of actions; stability against sliding, overturning, and floating
4.2.4 Embankment Dams: Earth and Rock-fill Dams; Basic design principles; Concept of Seepage through embankments; Considerations in foundation and slope stability
4.2.5 Concept of Cofferdams and their usage
4.2.6 Purpose, Types and Design of Spillways; types of spillway gates, location and their functions
4.2.7 Energy dissipation necessity, energy dissipation methods, types of energy dissipaters
4.2.8 Design concept of stilling basin and aprons for spillways
4.2.9 Intakes: Design, types, location of intake, trash rack, gravel traps and approach canal
4.3 Desanding Basin and Water Conveyance Systems of Hydropower
4.3.1 De-sanding Basin: Importance, Types, Location, and Usage of Desanding basin; Suspended Sediment Characteristics; Sediment velocities to be

considered in de-sanding basin design; Design of desanding basin, Flushing of sediments from de-sanding basin

4.3.2 Hydraulic Tunnels: Pressure and non-pressure tunnels, Tunnel cross section and size; Head losses in tunnels; Concept of tunnel stability and protection measures; Tunnel linings

4.3.3 Canals and Conduits: Selection and Design

4.4 Forebay, Surge tank, Penstock, Powerhouse, Switchyard and Tailrace of Hydropower

4.4.1 Importance and selection criteria; location and design; Concept of water hammer; Hydrodynamic pressure calculations; Design of forebay basin

4.4.2 Penstock Pipe

4.4.3 Importance, locations, and application; Anchor Blocks and Saddle Supports.

4.4.4 Under ground and surface power houses and their selection criteria; Power House Dimensions; Considerations in selection of underground power house, Tailrace and its importance, switchyard and its importance

4.5 Hydro-Mechanical and Electromechanical Installations

4.5.1 Types of turbines and their usage and selection criteria; Concept of specific speed; General concept of Gates and Valves, Draft Tube; Need and working principle of governors

4.5.2 Types of hydro-generators and their usage, transformer and auxiliary equipment

खण्ड (ख): ५० अङ्क

5. Cost of Electric Power

5.1 Optimization of size and cost of hydropower, solar and wind projects
5.2 Effect of size of operation and management costs
5.3 Unproductive capital and its effect on the cost of power
5.4 Different annual cost associated for effective operation of electric projects
5.5 Factors affecting cost of electric power
5.6 Levelized cost of electricity
5.7 Energy efficiency and cost reduction Surge tank- types, hydraulic design consideration structure and stability considerations

6. Engineering Economics

6.1 Disbursement scheduling, cash flow analysis, time value of money
6.2 Taxation system in Nepal
6.3 Project evaluation indicators and criteria for capital investment decision
6.4 Risk analysis, sensitivity analysis, inflation and price change
6.5 Allocation of limited resources in projects
6.6 Cost-benefit analysis
6.7 Financial analysis and socio-economic analysis
6.8 Cash flow analysis
6.9 Depreciation

7. Safety Engineering

7.1 Safety rules and regulations
7.2 Storage and handling of explosives, compressed gases and inflammable substances
7.3 Safety precautions in handling electrical installations in construction premises, earthing and shielding techniques

7.4 Fire hazards, firefighting techniques and equipment
7.5 Noise Hazards, Fire Fighting Techniques and Equipment
7.6 First Aid Requirements in case of health hazards
7.7 Field Instrumentation and Warning System
7.8 Occupational health and Safety
7.9 Environmental Safety and sustainability

8. Contract Management and Organization

8.1 Concept of contract and its fundamental principles
8.2 Preparation of contract documents, specifications, condition of contract and other contractual procedures
8.3 Familiarization with Procurement guidelines and standards of World Bank & Asian Development Bank and other development partners
8.4 International Standard Bidding Document, National Standard Bidding Document
8.5 Authorized Capital, Issued Capital, Paid Up Capital, Initial Public Offering and Final Public Offering, Bonus Share, Share Structures, Merger and Acquisition, Takeover, Transfer, etc.
8.6 Securities Board of Nepal, Office of Company Registration
8.7 Article of Association, Memorandum of Association, Shareholder's Agreement
8.8 Dispute Resolution

9. Power Sector Development

9.1 Role of government institutions involved in power sector development
9.2 Roles and importance of Independent Power Producers
9.3 Major projects under implementation and planning
9.4 Cross border and regional power trade, Importance of power exchange agreement with India, Scope of power exchange with other countries
9.5 Scope for export-oriented development of power sector
9.6 Bilateral and Multilateral Agreements and treaties in development of Nepali Power Sector
9.7 Coordination between stakeholders in power sector
9.8 Challenges and future prospects of power sector development in Nepal