

नेपाल विद्युत प्राधिकरण

प्राविधिक सेवा, सबै समूह/उपसमूहको तह १०, प्रबन्धक पदको खुला/आन्तरिक प्रतियोगितात्मक परीक्षाको लागि पाठ्यक्रम

पाठ्यक्रम योजनालाई निम्नानुसार तीन चरणमा विभाजन गरिएको छः

प्रथम चरण:-	लिखित परीक्षा	पूर्णाङ्क:- २००
द्वितीय चरण:-	प्रस्तुतिकरण	पूर्णाङ्क:- २०
तृतीय चरण:-	अन्तर्वार्ता	पूर्णाङ्क:- ३०

परीक्षा योजना (Examination Scheme)

प्रथम चरण: लिखित परीक्षा

पूर्णाङ्क:- २००

पत्र	विषय	पूर्णाङ्क	उतीर्णाङ्क	खण्ड	परीक्षा प्रणाली	प्रश्नसंख्या * अङ्कभार	समय
प्रथम	शासकीय प्रबन्ध, व्यवस्थापन र व्यवसायिकता	१००	४०	क	सैद्धान्तिक-तर्कयुक्त र विषयगत	१ प्रश्न * १५ अंक	३ घण्टा
				ख	समस्या समाधानमूलक प्रश्न	२ प्रश्न * २० अंक	
					समस्या समाधानमूलक प्रश्न	१ प्रश्न * २० अंक	
					मामिला विश्लेषण सम्बन्धी प्रश्न	१ प्रश्न * २५ अंक	
द्वितीय	सेवा सम्बन्धी विस्तृत ज्ञान	१००	४०	क	सैद्धान्तिक-तर्कयुक्त र विषयगत	१ प्रश्न * १५ अंक	३ घण्टा
				ख	समस्या समाधानमूलक प्रश्न	२ प्रश्न * २० अंक	
					समस्या समाधानमूलक प्रश्न	१ प्रश्न * २० अंक	
					मामिला विश्लेषण सम्बन्धी प्रश्न	१ प्रश्न * २५ अंक	

द्वितीय चरण:- प्रस्तुतिकरण

पूर्णाङ्क:- २०

विषय	पूर्णाङ्क	परीक्षा प्रणाली	समय
प्रस्तुतिकरण	२०	व्यक्तिगत प्रस्तुतिकरण	३० मिनेट

तृतीय चरण:- अन्तर्वार्ता

पूर्णाङ्क:- ३०

विषय	पूर्णाङ्क	परीक्षा प्रणाली
अन्तर्वार्ता	३०	मौखिक

द्रष्टव्यः

१. लिखित परीक्षाको माध्यम भाषा नेपाली र अंग्रेजी अथवा नेपाली अंग्रेजी दुवै हुन सक्नेछ।
२. प्रथम र द्वितीय पत्रको लिखित परीक्षा छुट्टै छुट्टै हुनेछ।
३. लिखित परीक्षामा सोधिने प्रश्नसंख्या र अंकभार यथासम्भव सम्बन्धित पत्र/विषयमा दिईए अनुसार हुनेछ।
४. विषयगत प्रश्नहरूको हकमा एउटा लामो प्रश्न वा एउटै प्रश्नका दुई वा दुई भन्दा बढी भाग (Two or more Parts of a single question) र एउटा प्रश्न अन्तर्गत दुई वा बढी टिप्पणीहरू (Short notes) वा आदि सोध्न सकिनेछ।
५. विषयगत प्रश्न हुने पत्र/विषयमा प्रत्येक खण्ड/प्रश्नका लागि छुट्टै छुट्टै उत्तरपुस्तिकाहरू हुनेछन्। परीक्षार्थीले प्रत्येक खण्ड/प्रश्नको उत्तर सोही खण्ड/प्रश्नको उत्तरपुस्तिकामा लेख्नु पर्नेछ।
६. यस पाठ्यक्रम योजना अन्तर्गतका पत्र/विषयका विषयवस्तुमा जुनसुकै कुरा लेखिएको भए तापनि पाठ्यक्रममा परेका कानून, ऐन, नियम, विनियम तथा नीतिहरू परीक्षाको मिति भन्दा ३ महिना अगाडि (संशोधन भएका वा संशोधन भई हटाईएका वा थप गरी संशोधन भई) कायम रहेकालाई यस पाठ्यक्रममा परेका सम्झनु पर्नेछ।
७. प्रथम चरणको परीक्षाबाट छनौट भएका उम्मेवारहरूलाई मात्र द्वितीय र तृतीय चरणको परीक्षामा सम्मिलित गराइनेछ।
८. प्रस्तुतिकरणको परिक्षामा प्रयोग हुने प्रश्न सो परीक्षा शुरु हुनु भन्दा अगावै निर्माण एवं परिमार्जन गरिनेछ।
९. पाठ्यक्रम स्वीकृत मिति:- २०८०/०८/२१

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लागि पाठ्यक्रम

प्रथम पत्र:

शासकीय प्रबन्ध, व्यवस्थापन र व्यावसायिकता
(Governance, Management and Professionalism)

खण्ड (क) : ५५ अङ्क

1. Governance

- 1.1. Meaning, features and dimensions of governance
- 1.2. Global Governance System
- 1.3. Corporate governance System
- 1.4. The federal, provincial and local level governance
- 1.5. New Public Governance
- 1.6. Co-governance

2. Public Administration

- 2.1. Concept of Public Administration
- 2.2. Basics elements of Personnel Administration
- 2.3. financial Administration: Budget Preparation, Implementation, Monitoring and Evaluation, Financial control
- 2.4. Fiscal Federalism: Managing Federal, Provincial and Local Government Revenue and Expenditure
- 2.5. Public Policy: Formulation, Implementation, Monitoring and Evaluation

3. Management and Financial Analysis

- 3.1. Contemporary issues and Emerging concept of management: Time management, Resource management, Change management, Technology management, Information management, Performance Management, Grievance management, Team management, Conflict management, Crisis management, Stress management, Risk management, Participative management, Disaster Management and Work culture
- 3.2. Role and Importance of Leadership, Motivation, Team work, Decision making, Control and coordination in Management
- 3.3. Corporate planning and strategic management
- 3.4. Skill, Competencies and knowledge for successful manager
- 3.5. Issues and Challenges for Manager
- 3.6. Corporate social responsibility
- 3.7. Capital Planning and Budgeting: Capital planning procedures, Preparation of operating budgets, fixed and flexible budget, budgetary control
- 3.8. 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; tariff structure
- 3.9. Management Information system, Enterprise Resource Planning
- 3.10. Issues and Challenges of Human Resource Management in Public Enterprises of Nepal

4. Ethics, morality and Accountability

- 4.1. Essence, determinants, consequences and dimensions of ethics
- 4.2. Human values, Norms and Perceptions
- 4.3. Ethics in public service
- 4.4. Ethical issues in public service delivery and utilization of public funds

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- 4.5. Challenges of corruption and corruption control strategies
- 4.6. Accountability, responsibility and authority
- 4.7. Compliance mechanism of public accountability
- 4.8. Spirituality at works

5. Professionalism

- 5.1. The foundational values for public service - integrity, impartiality, dedication, empathy, tolerance and compassion
- 5.2. Talent management
- 5.3. Negotiation skills

खण्ड: (ख) : ४५ अङ्क

6. Constitution, Policy, Act and Rules

- 6.1. Constitution of Nepal
- 6.2. Nepal Electricity Authority Act, 2041
- 6.3. Present Nepal Electricity Authority, Employee Service bylaws
- 6.4. Public Procurement Act, 2063, and Public Procurement Regulation, 2064
- 6.5. Present Nepal Electricity Authority, Financial Administration bylaws
- 6.6. Electricity Act, 2049 and Electricity Regulation, 2050
- 6.7. Electricity Regulatory Commission Act, 2074
- 6.8. Good Governance (Management and Operation) Act, 2064
- 6.9. National Water Resources Policy, 2075
- 6.10. Corruption Control Act, 2059
- 6.11. Land Acquisition Act, 2034
- 6.12. Environment Protection Act, 2076 and Environment Protection Regulation, 2077
- 6.13. Present Nepal Electricity Authority, Electricity distribution bylaws
- 6.14. Hydropower development policy, 2058
- 6.15. Labor act, 2074 and Labor Regulation, 2074

7. Power Sector Development in Nepal

- 7.1. Energy Supply & Demand - trend and challenges
- 7.2. Power Sector Development - history, generation structure, challenges and prospects
- 7.3. Private sector's participation in hydropower and Solar generation
- 7.4. Power Development Agreement (PDA), Power Purchase Agreement (PPA), licensing, feasibility study, Detail Engineering Design
- 7.5. Role of community electrifications and AEPC in public access to electricity
- 7.6. Nepal Electricity Authority: Corporate structure, functions of different business groups, NEA's Subsidiary & Associate Companies, objective, achievement and challenges
- 7.7. Concept of NEA Restructuring in federal context, Operational Performance
- 7.8. Various model of Investment for Hydropower development
- 7.9. Corporate Development Plan (CDP) of NEA

8. New Trends of Power Sector

- 8.1. Energy security, present and future energy mix scenario of : (1) Nepal, (2) Bilateral: BBIN, SAARC and (3) The world
- 8.2. Global efforts and achievements on Energy Efficiency, energy intensity
- 8.3. UN Initiatives on Sustainable and renewable energy promotion

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- 8.4. Concept of Energy banking, Energy Trading, Energy Exchange and Regional Grid, International Energy market trends
- 8.5. Financial & Technical Aspects of Cross Border Grid Connectivity
- 8.6. Recent international practices in power sector reform; Energy wheeling charge, Energy pool market, Availability based tariff

9. Grid Operation

- 9.1. Management of Active/Reactive power in complex system-challenges and opportunities for management
- 9.2. Power system stability – Issues and challenges
- 9.3. Control and protection: Importance, trends and challenges in complex electrical systems

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लागि पाठ्यक्रम
द्वितीय पत्र
सेवा सम्बन्धी विस्तृत ज्ञान
खण्ड: (क) : ५५ 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. Renewable Energy Technology: Micro hydro, solar photovoltaic and solar thermal energy, wind and geothermal power generation and their economic and environmental impacts, grid interconnection of renewable power generation, maximum power point tracking technologies
- 1.3. 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
- 1.4. Induction Generators: Types, Construction and operating principles, controllers for DFIG, harmonics generation, Field of applications
- 1.5. Transformers: Operating characteristics, Losses and efficiency, Voltage regulation, Grounding, Current harmonics, Parallel operation, Overloading capacity, Temperature rise, Auto-transformers, Instrument transformers operation, selection and applications

2. Power System Analysis

- 2.1. Performance analysis of transmission lines, Y and Z buses formation, Fault calculations using Zbus and by symmetrical component method, fault location in transmission and distribution systems
- 2.2. Corona phenomenon: Factors affecting corona, its disadvantages; corona loss, audible noise and radio interference
- 2.3. Inductive interference between power and communication systems
- 2.4. Transient stability: Equal area criterion, Swing equation for a multi-machine system, stability enhancement techniques
- 2.5. Protection of generators, transformers and transmission/distribution lines, protection coordination in grid systems
- 2.6. 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. Distribution system protection coordination
- 3.5. Power quality indicators: definition of power quality, voltage and frequency fluctuations, short and long duration voltage variations, waveform distortion and harmonics
- 3.6. Power quality issues: power acceptability curves, options to address power

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quality problem, Power quality standards

- 3.7. Voltage sag/swell; definition, standards, effects of sags on equipment, testing equipment, tolerance to voltage sags, areas of occurrence

4. Power Electronics in Power System

- 4.1. Switched mode DC-AC and AC-DC converters, Sinusoidal PWM, dynamic model and control of PWM inverters
- 4.2. AC-AC Converters: Single-phase AC regulator; Three-phase AC regulators, Single-phase and three-phase Cyclo-converters
- 4.3. Buck, boost & buck-boost converters construction, operation & applications
- 4.4. Basics of Flexible AC transmission systems (FACTS)
- 4.5. Principles of series and shunt compensation. Thyristor controlled compensators Static var compensators (SVC), series compensators (TCSC), series compensator (SSSC)
- 4.6. Phase shifters (SPS), and Unified power flow controller (UPFC), STATCOM
- 4.7. Active Front End Rectifiers: Power factor correction, single phase and three-phase, control schemes
- 4.8. Active filters

5. Electric 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. Power evacuation standards considering line congestion, stability and security criterion, guide line for preparing a Grid code
- 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

खण्ड: (ख) : ४५ अङ्क

6. Engineering Economics

- 6.1. General Characteristics of Capital Investments, Sources of Funds, Tax Considerations
- 6.2. Disbursement scheduling, Cash flow analysis, Time value of money
- 6.3. Project evaluation indicators, Payback period, IRR and others criterion, selection of best alternative
- 6.4. Incremental analysis, sensitivity & breakeven analysis
- 6.5. Risk analysis, Inflation & price change
- 6.6. Rationing limited financial resources between projects
- 6.7. Taxation system in Nepal, issues and challenges for investments in power projects in Nepal
- 6.8. Electricity tariff schemes, factors affecting electricity tariff, subsidy/cross subsidy issues in tariff designing and regulatory issues

7. Smart Grids

- 7.1. Evolution of Electric Grid, Elements and measurement technologies, Concept of Smart Grid, Opportunities and barriers, Scenario of Nepal, Architecture of Smart Grid, Smart Grid standards and policies, Smart Grid control layer and components, substation automation system (SAS)
- 7.2. Communication Technologies for Smart Grid: IEEE 802 series (Ethernet, Wireless LAN, ZigBee and 6LoWPAN, WiMAX), Mobile Communications, Multi-protocol label switching, Power line communication (IEEE P1901, Home Plug in PLCC), Standards for information exchange (Standards for smart metering, Modbus, DNP3, IEC 61850)
- 7.3. Transmission System Operation: Data Sources- IEDs and SCADA, Phasor Estimation, Phasor Measurement Units (PMU), Energy Management Systems, Wide Area Monitoring System (WAMS), Visualization techniques
- 7.4. Advanced Metering Infrastructure (AMI), Smart Meters, Real Time Pricing, Smart Appliances, Automatic Meter Reading (AMR), Outage Management System (OMS)

8. Power System Reliability and Risk Assessment

- 8.1. 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
- 8.2. Concepts of Hierarchical Level (HL); Generation Capacity planning; concepts and applications of LOLP, LOLE, EENS, ECOST, IEAR
- 8.3. Composite reliability evaluation: methods; common indices used; impact of tie line capacity and reliability
- 8.4. 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, impact of distributed generation
- 8.5. Reliability and its compliance in deregulated power system: challenges and governance, international perspectives, current state in Nepal, challenges and opportunities

9. Contract Management

- 9.1. Preparation of contract documents, specifications, condition of contract and other contractual procedures
- 9.2. Familiarization with procurement guidelines and standards of PPMO Nepal, World Bank & Asian Development Bank (WB & ADB)
- 9.3. Standard Bidding Document for ICB including for EPC contract, Standard Bidding Document for NCB including for EPC contract
- 9.4. Settlement of contractual disputes (mediation, arbitration and negotiation)

10. Trends and Status of Power Sector Development

- 10.1. Current state of Nepal's power sector, Role of Government institutions in Nepal's power sector, Significance of IPPs, Major projects under implementation and planning, Importance of power exchange agreement with India, Scope of power exchange with other countries, Coordination between stakeholders in

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power sector, Scope for export-oriented development of power sector, Issues and challenges in bilateral and regional electricity trade for Nepal

- 10.2. Electricity market: Market Principles and applications in power sector, Power Pool and Bilateral Agreement, Independent System Operator, Transmission system operator, Distribution System Operator, Market Participants, Power Markets, Market Rules, Bidding, Trading, Settlement System, Locational Marginal Pricing, Transmission pricing, Merchant Power, Congestion Management, Ancillary Services, Hedging, Spot Power Market

11. International Treaty and Conventions

- 11.1. Koshi Agreement, Gandak Agreement and Electricity Exchange agreements
- 11.2. Treaty between the then Government of Nepal and Government of India concerning the integrated development of Mahakali River including Sarada Barrage, Tanakpur Barrage and Pancheswar Project
- 11.3. Trends and issues in Project Development Agreements (PDA) and Power Purchase Agreements (PPA)

12. Service-Related Manuals

- 12.1. Manual for public Involvement in Environmental Impact Assessment (EIA) process of Hydropower Projects
- 12.2. Manual for preparing Terms of Reference (TOR) for environmental Impact Assessment (EIA) of Hydropower Projects
- 12.3. Manual for preparing Scoping Document for Environmental Impact Assessment (EIA) of Hydro power Projects
- 12.4. Manual for preparing Environmental Management Plan (EPM) for Hydropower Projects
- 12.5. National Environmental Impact Assessment Guidelines, 1993
- 12.6. Safety Guidelines and standards for Generation, Transmission and Distribution of Electricity
- 12.7. Compliance with standards, type tests and routine tests, need for Inspection & testing of electrical equipment
- 12.8. International standards: IEC, ISO, IEEE, AS, BS, IS, NS, EN, GB/T, JIS