नेपाल विद्युत प्राधिकरण

प्राविधिक सेवा, सिभिल समूह, सिभिल उपसमूह, तह–८ सहायक प्रवन्धक पदको
प्रतियोगितात्मक लिखित परीक्षाको पाठ्यक्रम

१. लिखित परीक्षाको विषय, पूर्णांङ्क, परीक्षा प्रणाली, प्रश्नसंख्या, अंकभार र समय निम्नानुसार हुनेछ ।

पत्र	विषय	पूर्णांङ्क	परीक्षा प्रणाली		प्रश्न संख्या	प्रति प्रश्न अंकभार	समय
प्रथमपत्र	सेवा सम्वन्धी	७०	विषयगत	छोटो उत्तर	८	५	२ घण्टा
				लामो उत्तर	३	१०	
द्वितीयपत्र	व्यवस्थापकीय ज्ञान	३०	विषयगत	छोटो उत्तर	३	५	१ घण्टा
				समस्या समाधान	१	१५	

२. प्रथमपत्र र द्वितीयपत्रको परीक्षा २ पटक गरेर हुनेछ । प्रथमपत्रको परीक्षा सकिए पछि द्वितीयपत्रको परीक्षा तत्काल हुनेछ ।

३. परीक्षाको माध्यम नेपाली वा अंग्रेजी भाषा हुनेछ ।

४. सामान्यत: प्रत्येक शिर्षकको अंकभार तोकिए बमोजिम हुनेछ ।

प्रथमपत्र : सेवा सम्वन्धी [70]

1. Hydrological and Sedimentological Studies [7]

- Hydrology
  - i. Drainage Area
    - a. Basic knowledge of drainage area and its characteristics
    - b. Rainfall and stream flow data.
    - c. Analysis of rainfall and stream flow data.
    - d. Determination of low flows and high flows
  - ii. Floods
    - a. Causes and occurrence of floods
    - b. Flood hydrographs.
    - c. Flood estimates
  - iii. River discharge
    - a. Methods of flow measurement.
    - b. Area capacity curve.
    - c. Rating curves.
    - d. Flow duration curve.
- Glacier lake outpurst flood
  - i. Basic knowledge of snow and glacier hydrology
  - ii. Glacier lake outburst flood (GLOF) and its phenomena
- Sedimentation
  - i. Basic knowledge of sedimentation, sediment transportation and its effect.
  - ii. Sediment sampling
  - iii. Estimates of sediment volume and its construction

2. Project Engineering [3]

- Power market survey
- Load demand forecast and determination of capacity requirement.
- Site selection.
- Different stages of project studies.
- Field investigations.
  - General reconnaissance
  - Topographical survey
  - Hydrological investigation.

- Sedimentological investigation
- Geological investigations
- Sub-surface exploration
- Seismological studies
- Material investigation

- Project preparation for implementation and justification of the Project.
- Types of Hydropower Projects.

3. Optimization Study [3]

- Optimization of dam height.
- Optimization of water conveyance system.
- Optimization of installed capacity, firm capacity of plant and dependable capacity.
- Determination of load factor, utilization factor and plant capacity factor.
- General knowledge of firm energy, useable energy and secondary energy.
- Daily pondage basin and its importance for run-off-river schemes.

4. Hydraulics and Hydraulic Model Tests [3]

- Flow in natural channels, open channels and closed conduits
- hydraulic Transients
- Basic knowledge of:
  - Hydraulic gradient
  - Friction lossess
  - Water hammer
  - Hydraulic jump
  - Specific energy

5. Oerall Design of Hydro-Electric Projects [6]

- General layout of hydaulic structures
- Selection of surface structures and underground structures
- Output and capacity of the plant
- Water conveyance structures
- Storage reservoirs
- Down stream compensation water release
- fish passing facilities
- Stations "In Cascade"
- Economic Parameters (Factors)
- Intial Environmental Examination (IEE) and Environmental Impact Assessment (EIA)

6. Types of Dams and Their Selection Criteria with relation to site conditions [10]

- Concrete Dam
  a. Concept of arch dam
  b. Concrete gravity dam
     - Concept of concrete gravity dams
     - Forces acting on a gravity dam and their line of actions
     - Stability against sliding and overturning
     - Bearing stresses
     - Preparation of foundations
     - Deposition of concrete on foundations
     - Subdivision of the concrete mass
     - Temperature control, concrete joints and height of concreting lifts
     - Water stops and seals
     - Inspection and drainage galleries

c. Embankment Dams
   - Basic knowledge of embankment dams
   - Types of embankment dams
   - Basic design principles
   - Seepage through embankments
   - Stability of the slopes and foundations
   - Stability analysis
   - Influence of pore pressure of stability
   - Stability on different loading conditions such as:
     - During and at completion of construction
     - When the reservoir is full
     - During drawdown condition
   - Special problems associated with earthfill and rockfill dams
   - Design in earthquake areas
   - Knowledge of computer aided design and software packages for design
   - Selection of riprap and filter materials

7. <u>Spillway and Flood Control Works</u> [7]

- Conditions affecting the design of spillway works
- Determination of the required spillway capacity
- Fied crest spillways
- Ogee crest spillways
- Siphon spillways
- Types of flood gates
  - Vertical lift gates
  - Radial gatesTilting flap gates
  - Drum gates
  - Other types of flood gates
- Gate details
  - Barrage gates
  - Flow control gates
- Automatic control of flood gates
- Energy dissipation

8. <u>Headworks and Equipment</u> [3]

- Types of intakes
- Hydraulic design of intakes
- construction of low level intakes
- Size of intake gates
- Design of trash rack
- Desanding basin
- Flushing structures
- Gravel traps and its flushing structures

9. <u>Canals and Free Flowing Channels</u> [3]

- Selection of types of canal
- Basic hydraulic design
- Uniform flow
- Headrace and tailrace canals
- Spillway channels
- Unsteady flow

- Surges and waves

10. Tunnels [3]

- Location and hydraulic design
- Cross sectional form and size
- Tunneling procedure
- Temporary supporting and permanent supporting
  - Shotecreting
  - Rockbolting
  - conrete lining
  - Grouting
- Storage and care of explosives

11. Surge Chambers [2]

- Types of surge chambers and their function
- Design of surge chambers
- Behavior of surge chambers
- Regulation and stability

12. Penstock [2]

- Hydraulic design of penstock
- Design of anchor blocks and saddle supports
- concept of underground penstock and its construction

13. Power Station Design and Construction [3]

- General Arrangement
- Powerhouse substructure – its design and construction details
- Powerhouse superstructure – its structural framework and building details

14. Underground Power Stations [2]

- Necessity of underground power stations
- Construction of underground power stations

15. Multi-Purpose Hydropower Projects [2]

- Benefits of river basin development.
- Multi-purpose hydropower projects and their planning.
- Special considerations affecting power development.
- Examples of multi-purpose Projects.

16. Reservoirs – Problems of Sedimentation [3]

- Influence of forest on rainfall.
- Evaporation.
- Sedimentation and causes of erosion.
- Effects of deforestation on soil erosion.
- Soil conservation.
- Effect of dams on river regime.
- Mechanism of reservoir silting.
- control of silting.

17. Maintenance of Civil Engineering Works [3]

- Maintenance and its requirement.
- Maintenance processes.
- Scheduling and programming of preventive maintenance.
- Maintenance squad.
- Maintenance of:

- Reservoirs
- Dams and spillways
- Hydraulic equipment
- Canals and forebays
- Tunnels
- Pipelines
- Powerstation

18. Overview of Impact on Environment and fishery requirements [3]

- concept of IEE and EIA.
- Effect of Hydro-electric works on Fishery.
- Provision and management of fish passing facilities.

19. Safety Engineering [2]

- Safety rules and regulations.
- Storage and handling of explosives, compressed gases and inflammable substances.
- Safety precautions in handling electrical installations in construction premises, earthing and shielding techniques.
- Fire hazaards, fire fighting techniques and equipment.
- Noise hazards, its sources, effect on health and control.
- First aid requirements in case of health hasards.
- Field instrumentation and warning systems.

द्वितीयपत्र : व्यवस्थापकीय ज्ञान [30]

A. 1. POWER SECTOR DEVELOPMENT AND INSTITUTIONS INVOLVED: [3]

History of power development in Nepal, Energy demand supply trends, Challenges and prospects of hydropower development, Importance of power exchange agreement with India, Scope of power exchange with other countries, Coordination between stakeholders in power sector, Scope for export oriented development of power sector, NEA's mission and objectives, Basic trends in NEA development, Policies and programs of NEA, Financing of NEA, Indicators of NEA financial performance, NEA rules and regulations on employment, procurement and promotions, Inventory control, Impediments for growth and possible reform measures, Role of Government institutions involved in power sector development, Role and importance of IPPs, Major projects under implementation and planning.

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.

3. ENGINEERING ECONOMICS: [2]

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

4. PROJECT MANAGEMENT: [3]

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.

5. ORGANIZATION AND MANAGEMENT: [2]

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

B. समस्या समाधान : [15]

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

(१) समस्याका खास खास कारणहरु दर्शाउने ।

(२) समस्या समाधानका लागि सुझावहरु प्रस्तुत गर्ने ।

(३) प्रस्तुत सुझावहरु कार्यान्वयन गर्दा त्यसवाट पर्न सक्ने सकारात्मक प्रभावहरु उल्लेख गर्ने ।

द्रष्टव्य: पाठ्यक्रममा राखिएका संविधान, ऐन, नियम र विनियमहरु परीक्षा हुनु भन्दा ३ महिना अगाडी सम्म संशोधन वा खारेज भई त्यसको सट्टा हाल प्रचलनमा रहेकालाई सोही अनुरुप पाठ्यक्रममा समावेश भएको मानिने छ ।

◆