नेपाल विद्युत प्राधिकरण

प्राविधिक सेवा, सिभिल समुह, सिभिल उपसमूह, तह-९ उप प्रबन्धक पदको खुला तथा आन्तरिक प्रतियोगितात्मक लिखित परीक्षाको पाठ्यक्रम

द्वितीय पत्रः सेवा सम्बन्धी विस्तृत ज्ञान (१०० पुर्णाङ्क)

पत्र	विषय	पुर्णाङ्क	उत्तीर्णाङ्क	खण्ड	परीक्षा प्रणाली	प्रश्न संख्या	प्रति प्रश्न अङ्कभार	समय
द्वितीय	सेवा सम्बन्धी (विस्तृत ज्ञान)	१००	४०	क	लामो उत्तर/ विश्लेषणात्मक समिक्षा	२	१५	३ घण्टा
					विश्लेषणात्मक समिक्षा/समस्या समाधान	१	२०	
				ख	लामो उत्तर/ विश्लेषणात्मक समिक्षा	२	१५	
					विश्लेषणात्मक समिक्षा/समस्या समाधान	१	२०	

खण्ड (क) (२x१५=३०, १x२०=२०) – अङ्क ५०

1. **Overview of Hydrology and Sedimentology**
2. **Project Engineering:**
   - 2.1. Power market survey
   - 2.2. Load demand forecast and determination of capacity requirement
   - 2.3. Site selection
   - 2.4. Different stages of project studies
   - 2.5. Field investigations:
     - 2.5.1. Reconnaissance survey
     - 2.5.2. Topographical survey
     - 2.5.3. Hydrological investigation
     - 2.5.4. Sedimentological investigation
     - 2.5.5. Geological investigations
     - 2.5.6. Sub-surface exploration
     - 2.5.7. Seismological studies
     - 2.5.8. Material investigation
     - 2.5.9. Landslide hazard mapping
   - 2.6. Different stages of Project Development.
   - 2.7. Types of Hydropower Projects (Run-off-River (RoR), Peaking Run-off- River (PRoR) and Reservoir).
   - 2.8. Knowledge of DoED Guideline for study of Hydropower Projects, 2018
3. **Optimization Study:**
   - 3.1. Optimization of installed capacity
   - 3.2. Determination of load factor, utilization factor and plant capacity factor

3.3. Firm energy and secondary energy

3.4. Reservoir and PRoR Schemes and their importance for run-off-river schemes

4. Overall Design of Hydro-Electric Projects:

4.1. General layout of Hydropower Project from Headworks to Power House and Hydraulics Structures

4.2. Overview of Water Conveyance Structures

4.3. Selection of surface structures and underground structures

4.4. General arrangement of electrical and mechanical installations

4.5. Output and capacity of the plant

4.6. Optimization of water conveyance system

4.7. Economic Diameter of Penstock

4.8. Overview of Power House

4.9. Power House Design and planning

4.10. Relationship between Dam and Adjacent Power House

4.11. Reservoirs

4.12. Downstream water release.

4.13. Fish passage facilities

4.14. Cascade development

4.15. Knowledge of DoED Power House Design Guidelines for Hydropower Projects, 2018

4.16. Knowledge of DoED Design Guidelines for water conveyance system of Hydropower Projects

4.17. Knowledge of DoED Design Guidelines for Headworks of Hydropower Projects

5. Design of Dams and its Structures:

5.1. Overview and design of different Types of dams

Design of Embankment Dam, Concrete Dam, Roller Compacted Concrete (RCC) Dam, Rock – Filled Concrete (RFC) Dam

5.2. Factor affecting on selection of economic dam site

5.3. Factors affecting on design & constructions in different types of dams

5.4. Floods and their economic aspects

5.5. Spillway capacity

5.6. Economic height of dam

5.8. Stability Analysis of Embankment dams, Concrete Dams, RCC Dams and RFC Dams

6. Flood:

6.1. Types of Floods and their analysis

6.2. Flood estimate and their effect on Hydropower Projects

6.3. PMF and its significance

6.3. Pre-monsoon flood

6.4. Landslide Dam outburst flood (LDOF)

6.5. Glacier Lake outburst flood (GOLF)

7. Cost of electric Power:

7.1. Optimization of size and cost of Hydro, solar and wind projects based on cost and revenue

7.2. Effect of operation and management costs

7.3. Unproductive capital and its effect on the cost of Power

7.4. Different annual cost associated for effective operation of electric projects

7.5. Factors affecting cost of electric power

7.6. Levelized cost of electricity

8. Engineering Economics:

8.1. Disbursement schedule, Cash flow analysis, Time value of money

8.2. Project evaluation indicators, IRR, RoE, Payback period, EIRR, FIRR and others Criterion, Selection of best alternative

8.3. Incremental Analysis, Sensitivity & breakeven analysis

8.4. Risk analysis, Inflation & price change

8.5. Taxation system in Nepal

8.6. Energy tariff schemes and regulatory issues

खण्ड (ख) (२x१५=३०, १x२०=२०) – अङ्क ५०

9. Multi-Purpose Hydropower Projects:

9.1. Multi-purpose hydropower projects and their planning

9.2. Benefits of Multipurpose Hydropower Projects

9.3. Benefits of river basin development

10. Storage and Related Economic Problems:

10.1. Storage cost

10.2. Minimum flow analysis

10.3. Consequences of short supplies

10.4. Downstream regulation Dam and its cost

11. Reservoirs - Problems of Sedimentation:

11.1. Management of Sedimentation in Reservoir

11.2. Evaluation and effect of Sedimentation on Power Production.

11.3. Influence of forest on rainfall.

11.4. Evaporation.

11.5. Sources of sedimentation on Reservoir.

11.6. Effects of deforestation on soil erosion.

11.7. Soil conservation.

11.8. Effect of dams on river regime.

11.9. Mechanism of reservoir silting.

11.10. Function silting basin.

11.11. Disaster Management Plan.

12. Safety Engineering:

12.1. Safety rules and regulations

12.2. Storage and handling of explosives, compressed gases and inflammable substances

12.3. Safety precautions in handling electrical installations in construction premises, Earthing and shielding techniques

12.4. Fire hazards, firefighting techniques and equipment

12.5. Noise hazards, its sources, effect on health and control

12.6. First aid requirements in Project site

12.7. Field instrumentation and warning systems

13. Contract management:

13.1. Familiarization with Public Procurement Acts, Regulation and guidelines as well as standards of World Bank, Asian Development Bank and Asian Infrastructure Investment Bank

13.2. Preparation of contract documents, specifications, condition of contract and other contractual procedures.

13.3. International Standard Bidding Document, National Standard Bidding Document

13.4. Arbitration and Mediation

14. Project Scheduling of Planning:

14.1. Concept of Project Scheduling

14.2. Resource Planning & Management

14.3. Analysis of Critical Path, CPM & PERT

15. Quality Control:

15.1. Need of Quality Control

15.2. Mechanism of Quality Control

15.3. Technical Auditing

15.4. Quality Control Management

15.5. Quality Assurance Plan

16. Social Aspect & its Management:

16.1. Social Issues in Hydropower Project

16.2. Grievance Mechanism

16.3. Importance & Process of CSR

17. International Treaty and Conventions:

17.1. Koshi Agreement, 1954/1966

17.2. Gandak Agreement, 1959

17.3. Electricity Exchange 1961

17.4. Treaty between the Government of Nepal and Government of India concerning the integrated development of Mahakali River including Sarada Barrage, Tanakpur Barrage and Pancheswar Project.

18. Service-Related Manuals:

18.1. The Environment Protection Act and Regulation 2019

18.2. Manual for public Involvement in Environmental Impact Assessment (EIA) process of Hydropower Projects

18.3. Manual for preparing Terms of Reference (TOR) for environmental Impact Assessment (EIA) of Hydropower Projects

18.4. Manual for preparing Environmental Management Plan (EPM) for Hydropower Projects

18.5. National Environmental Impact Assessment Guidelines, 1993

18.6 Safety Guidelines and standards for Generation, Transmission and Distribution of Hydro Electricity.