नेपाल विद्युत प्राधिकरण

प्राविधिक सेवा, सिभिल समूह/उपसमूह तह–९ उप प्रवन्धक पदको खुला तथा आन्तरिक प्रतियोगितात्मक लिखित परीक्षाको पाठ्यक्रम

द्वितिय पत्रः सेवा सम्वन्धी बिस्तृत ज्ञान (१०० पुर्णाङ्क)

खण्ड कः (२×१५=३०, १×२०=२०) – ५० अंक

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 General reconnaissance
     - 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 Sesmological studies
     - 2.5.8 Material investigation
   - 2.6 Project preparation for implementation and justification of the Project
   - 2.7 Types of Hydropower Projects
3. **Optimization Study:**
   - 3.1 Optimization of installed capacity, firm capacity of plant and dependable capacity
   - 3.2 Determination of load factor, utilization factor and plant capacity factor
   - 3.3 Firm energy, useable energy and secondary energy
   - 3.4 Daily pondage basin and its importance for run-off-river schemes
4. **Overall Design of Hydro-Electric Projects:**
   - 4.1 General layout of hydraulic 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 Overview of Power Station
   - 4.8 Power Station Design
   - 4.9 Storage reservoirs

4.10 Down stream compensation water release.

4.11 Fish passing facilities

4.12 Stations "In Cascade"

5. Design of Dams and its Structures:

5.1 Overview and design of different Types of 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

5.7 Stability Analysis of Concrete Gravity and Embankment dams

6. Aesthetics of Hydro-Electric Structures:

6.1 Relationship between Dam and Adjacent Power Station

6.2 Planning and design of Surface structures

6.3 Planning and design of Modern Power Stations

7. Basic Factors in the economic Analysis of Hydro-electric Projects:

7.1 Economic scale of development

7.2 Plant capacity in relation to the stream flow

7.3 Load factor

7.4 Plant capacity factor

8. Cost of electric Power:

8.1 Optimization of size and cost of Hydro, solar and wind projects

8.2 Effect of size of operation and management costs

8.3 Unproductive capital and its effect on the cost of Power

8.4 Different annual cost associated for effective operation of electric projects

8.5 Factors affecting cost of electric power

8.6 Levelized cost of electricity

9. Engineering Economics:

9.1 Disbursement scheduling, Cash flow analysis, Time value of money

9.2 Project evaluation indicators, IRR, Payback period and others Criterion, Choosing the best alternative

9.3 Incremental Analysis, Sensitivity & breakeven analysis

9.4 Risk analysis, Inflation & price change

9.5 Rationing limited financial resources between projects

9.6 Taxation system in Nepal

9.7 Energy tariff schemes and regulatory issues.

खण्ड ख: (२×१५=३०, १×२०=२०) – ५० अंक

10. Multi-Purpose Hydropower Projects:

10.1 Multi-purpose hydropower projects and their planning

10.2 Benefits of Multipurpose Hydropower Projects (MPHPs)

10.3 Benefits of river basin development

11. Storage and Related Economic Problems:

11.1 Cost of Storage

11.2 Minimum dry weather flow

11.3 Consequences of short supplies

11.4 Cost of providing uniform regulated discharge

12. Reservoirs - Problems of Sedimentation:

12.1 Influence of forest on rainfall

12.2 Evaporation

12.3 Sedimentation and causes of erosion

12.4 Effects of deforestation on soil erosion

12.5 Soil conservation

12.6 Effect of dams on river regime

12.7 Mechanism of reservoir silting

12.8 Control of silting

13. Maintenance of Civil Engineering Works:

13.1 Maintenance and its requirement

13.2 Maintenance processes

13.3 Scheduling and programming of preventive maintenance

13.4 Maintenance squad

13.5 Maintenance of:
- 13.5.1 Reservoirs
- 13.5.2 Dams and spillways
- 13.5.3 Canals and forebays
- 13.5.4 Tunnels
- 13.5.5 Pipelines
- 13.5.6 Powerstation

14. Safety Engineering:

14.1 Safety rules and regulations

14.2 Storage and handling of explosives, compressed gases and inflammable substances

14.3 Safety precautions in handling electrical installations in construction premises, earthing and shielding techniques

14.4 Fire hazards, fire fighting techniques and equipment

14.5 Noise hazards, its sources, effect on health and control

14.6 First aid requirements in case of health hazard

14.7 Field instrumentation and warning systems

15. Contract management:

15.1 Familiarization with Procurement guidelines and standards of World Bank & Asian Development Bank

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

15.3 International Standard Bidding Document, National Standard Bidding Document

15.4 Arbitration

16. Trends and Status of Power Sector Development:

16.1 Role of Government institutions involved in power sector development

16.2 Role and importance of IPPs

16.3 Major projects under implementation and planning

16.4 Cross border/regional power trade

16.5 Scope for export oriented development of power sector.

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

18.2 Manual for preparing Terms of Reference (TOR) for environmental Impact Assessment, (EIA) of Hydropower Projects

18.3 Manual for preparing Scoping Document for Environmental Impact Assessment (EIA) of Hydro power 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.

The end