नेपाल विद्युत प्राधिकरण

प्राविधिक सेवा, मेकानिकल समुह, तह-८, सहायक 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. Hydropower engineering:

1.1. History and development of Hydro power in Nepal and world

1.2. Types of Hydro power plant: run-of-river, Peaking RoR, storage, pumped storage

1.3. Classification of hydropower plant: large, medium, small, mini and micro hydropower plants

1.4. Safety measures and precautions applied in power plant

1.5. Environmental impact of hydropower plant

2. Water turbines:

2.1. Classification of turbines on various criteria

2.2. Main components of turbines and their functions

2.3. Working principle of turbines and their efficiencies

2.4. Specific speed of a turbine

2.5. Criteria for Selection of turbines

2.6. Operation & Maintenance of turbines & its Components.

3. Water turbine governors:

3.1. Types and working principles

3.2. Operation and maintenance

4. Bearings: Types, Operation & Maintenance in hydro plant:

4.1 Turbine guide bearings

4.2 Generator Lower bearings

4.3 Generator Cumbered (thrust & guide) bearings.

5. Hydro-mechanical equipment:

5.1 Types, selection, use and design of gates, Stop Logs, seals, Values and hosting equipment

5.2 Use and design of trash rack and safety rack

5.3 Design, selection of penstock and accessories

6. Constructional detail and Types of Transmission Tower:

6.1 Types & selection criteria of Towers

6.2 Design, Erection & Maintenance

7. Power plant instruments:

7.1 Measurement of pressure, flow, temperature, speed, voltage, ampere, power and energy

7.2 Types of communication used in utilities and their application

8. Renewable energy technologies:

8.1 Renewable energy sources: biomass, solar energy, wind energy, geothermal energy, hydropower

8.2 Renewable energy technologies for electricity generation: solar PV, wind power generator, biogas generator, micro-hydro power plant

8.3 Role of renewable energy technologies in rural electrification

8.4 Environmental benefits of renewable energy technologies

खण्ड (ख) (२x१५=३०, १x२०=२०) – अङ्क ५०

9. Construction equipment:

9.1 Introduction to construction equipment: types, general specification and application of construction equipment

9.2 Selection Criteria, uses of various Construction equipment.

9.3 Hydraulic system: pump, valve, cylinders and motors, accumulator and filters, reservoirs, hoses, pipe, tubes and couples, seals and fluids

9.4 Transmission: clutches, mechanical transmission, hydraulic assist transmissions, power shift transmission, hydrostatic drive, torque converters, differential, final drive, power take-offs, special drives

9.5 Undercarriage: track chain, idler, sprocket, track rollers, tyres

9.6 Implements and tools: blades, rippers, bucket

9.7 Electronic components and their functions

9.8 Repair and maintenance of construction equipment

10. Engineering economics:

10.1 Cash flow analysis, project evaluation indicators

10.2 Criteria for capital investment decision, risk analysis

10.3 Taxation system in Nepal, energy tariff and regulatory issues

11. Contract management:

11.1 Familiarization with procurement guidelines and standards Nepal and doner agency (World Bank, ADB etc.)

11.2 Preparation of contract documents, specifications, condition of contract and other contractual procedures

11.3 Arbitration

12. Internal combustion engine and pollution:

12.1 Introduction to IC engine: engine classification, engine operating cycles, engine components

12.2 Thermo-chemistry of fuel-air mixture: characteristics of flames, composition air and fuel, combustion stoichiometry, the first law of thermodynamics and combustion, the second law of thermodynamics applied to combustion

12.3 Fuel and fuel supply system: types of fuel used in IC engines, fuel supply system in SI and CI engines

12.4 Ignition system: purposes, types, components and their functions, problem associated with ignition system

12.5 Cooling system: purposes, types, components and their functions, problems related to cooling system

12.6 Lubricants and lubricating system: classification of lubricants and their uses, purposes, types, components and their functions of lubricating system

12.7 Pollution formation and control: pollution formation (source and chemistry), emission standards (national and international); tailpipe emission measuring instrument (gas analysers); controlling measures (engine design, after treatment and use of alternative fuels; noise pollution)

12.8 Engine operating characteristics: engine performance parameters, indicated and brake power and mean effective pressure; operating variables that affects SI engine performance, efficiency and emission; SI engine combustion chamber design; variables that affect CI engine performance, efficiency and emissions; supercharged and turbocharged engine performance

13. Air conditioning:

13.1 Air conditioning system design: summer air conditioning, winter air conditioning

13.2 Estimation of cooling and heating load

13.3 Selection of air conditioning apparatus for cooling

13.4 Noise, vibration and volume control

14. Service-related manuals:

14.1. Safety guidelines/standards for electricity generation, transmission and distribution of hydropower projects.

15. Working principles, Operation & maintenance of Hydropower plant auxiliary system:

15.1 High pressure Oil System,

15.2 lubrication system, Turbine Oil & grading

15.3 Braking and jacking system,

15.4 Carbon dust collection system for slip rings,

15.5 Oil filtration System,

15.6 Cooling water System

15.7 E.O.T. crane,

15.8 Heating Ventilation and air conditioning (HVAC)

15.9 Compressed air system,

15.10 Dewatering and drainage system

15.11 Black Start and diesel generator system

15.12 Shaft Sealing System

15.13 Pumps (Cooling, Denaturing drainage)

16. Maintenance Practices in Power plant:

16.1. Preventive Maintenance, Condition Monitoring overhandling of Turbines, Schedule maintenances

16.2 Repair & Breakdown Maintenance

16.3 Management minimisation of downtime (Shutdown) of units