

## द्वितीय पत्र: प्राविधिक विषय

### 1. Electrical Machine

- 1.1 Transformers
- 1.2 Synchronous Generators and Motors
- 1.3 Induction Generator/Motors

### 2. Power System Analysis

- 2.1 High voltage Transmission System
- 2.2 Load flow stud.
- 2.3 Power system stability
- 2.4 Steady-state stability implications, series and shunt compensation
- 2.5 Performance of transmission lines- short, medium and long lines
- 2.6 Surge impedance and surge impedance loading of transmission lines
- 2.7 Skin effect, corona
- 2.8 Load dispatching
- 2.9 Demand Side Management
- 2.10 Single-phase and three-phase distribution system
- 2.11 Rural distribution system
- 2.12 Protection coordination in distribution system
- 2.13 Quality of electricity

### 3. Control and Protection

- 3.1 Types of fault in power system
- 3.2 Fault calculation
- 3.3 Principles of power system protection.
- 3.4 Isolators and contractors
- 3.5 Circuit breakers: Vacuum, air, oil and SF<sub>6</sub>
- 3.6 Types of relays
- 3.7 Protection of generators, transformers and transmission/distribution lines.\
- 3.8 Earthing and shielding technique
- 3.9 Lighting protection.

### 4. Rural Electrification

- 4.1 Electricity and rural development
- 4.2 Technology and approaches for rural electrification
- 4.3 Role of micro and mini hydropower, solar power

### 5. Power Plants

- 5.1 Hydropower potential
- 5.2 Hydropower plant
- 5.3 Substation layout
- 5.4 Turbine types and application
- 5.5 Pumped storage plant
- 5.6 Environmental impacts of steam, gas, nuclear, wind and solar power plants

### 6. Safety Engineering

- 6.1 Effects of non-ionizing magnetic fields on human body
- 6.2 Physical effect of electric shock

- 6.3 Safety rules and regulations
- 6.4 Safety tools and devices
- 6.5 Earthing and shielding technique
- 6.6 Fire hazards
- 6.7 Fire fighting techniques and equipment
- 6.8 Noise hazard

## **7. Engineering Economics**

- 7.1 Cash flow analysis
- 7.2 Project evaluation indicator
- 7.3 Payback period
- 7.4 Risk analysis
- 7.5 Taxation system in Nepal
- 7.8 Energy Tariff

## **8. Project Management**

- 8.1 Project Planning and Scheduling
- 8.2 Capital Planning and Budgeting
- 8.3 Project Monitoring and control

## **9. Organizational Management**

- 9.1 Internal Organization
- 9.2 Management Information System
- 9.3 Motivation and Leadership
- 9.4 Personal Management
- 9.5 Familiarization with procurement guidelines and standard of World Bank, ADB
- 9.6 Preparation of Contract documents, specifications, condition of contract and other contractual procedure

## **10. Electric Energy System Management**

- 10.1 Electric Power Utility Organization
  - 10.2 Economic Analysis and Control of Power Utility
  - 10.3 Prediction of Electric Load Levels and Changes
  - 10.4 Scheduling to Meet Generation Requirements
  - 10.5 Real-time Economic assessment of generation and energy dispatch
  - 10.6 Concept of Grid Code
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