

## नेपाल विद्युत प्राधिकरण

प्राविधिक सेवा, सिभिल समुह, सर्भे उप समूह, तह-८ सहायक प्रबन्धक पदको  
खुला तथा आन्तरिक प्रतियोगितात्मक लिखित परीक्षाको पाठ्यक्रम

द्वितीय पत्र: 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. Fundamentals of Surveying:

- 1.1. Introduction to Surveying: Concept and Principles
- 1.2. Linear and Angular Measurement Techniques
- 1.3. Basics of Chain, Tape, and Compass Surveying
- 1.4. Basics of Plane Table Surveying: Introduction and Techniques of Plane Table Surveying; Orientation, Intersection and Resection
- 1.5. Modern Equipment for spatial data collection, and linear and angular measurements
- 1.6. Survey computations: Bearing, Coordinates, Reduced Level, Area & Volume
- 1.7. Sources and Types of Errors; Theory of Errors and Adjustment
- 1.8. Selection, Use, Feasibility, Sustainability, Transfer and Development of Surveying Technology
- 1.9. Procurement, Maintenance and Upgrading of Instruments, Hardware, and Software
- 1.10. Application of surveying in hydropower development

### 2. Survey Management:

- 2.1. Survey Need Assessment
- 2.2. Survey Project Formulation
- 2.3. Logistical Arrangement for Surveying including Equipment and accessories
- 2.4. Safety Management
- 2.5. Community Skill of Surveyor
- 2.6. Professional Ethics and Code of Conduct
- 2.7. Institutional Coordination: Survey Office, Land Revenue Office, and other relevant organizations

**3. Levelling:**

- 3.1. Introduction to Leveling: Definition, Principles, Applications, Technical Terminologies, Types
- 3.2. Leveling computations: reduced level, profile, cross sections
- 3.3. Sources of Error and Error Adjustment
- 3.4. Trigonometric levelling; determination of height and distances of inaccessible objects, reciprocal trigonometric levelling
- 3.5. Significance of Leveling in Hydropower Projects.

**4. Traversing:**

- 4.1. Definition, application, and Types
- 4.2. Angular and Distance Measurement
- 4.3. Traverse Computation
- 4.4. Sources of Errors and Error Adjustment

**5. Triangulation and Trilateration:**

- 5.1. Principles of triangulation and trilateration
- 5.2. Computations and adjustment of triangulation and trilateration

**6. Tacheometry:**

- 6.1. Principles, Application and methods of Tacheometric Survey
- 6.2. Measurement and Computations in Tacheometry

**7. Computation of Area and Volume:**

- 7.1. Computation of Area: by ordinates, coordinates and double meridian distance method
- 7.2. Computation of Volume: by average end area, Prismoidal formula, trapezoidal rule and Simpson's 1/3 rule

**8. Cadastral surveying and Land Administration:**

- 8.1. Basics of Cadastral Surveying and its application
- 8.2. Cadastral surveying methods
- 8.3. Land Administration System of Nepal
- 8.4. Organizational Arrangement for cadastral surveying and land administration in Nepal
- 8.5. Availability of cadastral and land ownership related data
- 8.6. Land Acquisition Act, 2034 and regulations; process of land acquisition, complexities of land acquisition in Nepal, Compensation issues

**9. Geodesy:**

- 9.1. Coordinate system and star coordinate updating
- 9.2. Mathematical model for latitude, longitude and azimuth
- 9.3. Transformation between local and global system
- 9.4. Celestial system

**10. Global Navigation Satellite System (GNSS):**

- 10.1. Basics of Space Geodesy
- 10.2. Concept and Principles of GNSS;
- 10.3. Types of GNSS; GPS, GLONAS, Bei Dou, Galileo, QZSS; significance of different GNSS systems
- 10.4. GNSS Signals, biases and solutions
- 10.5. GNSS Components
- 10.6. Coordinate Systems and Spheroid used in different GNSS system
- 10.7. GNSS Data processing; Significance of CORS, availability of CORS in Nepal
- 10.8. Procurement of GNSS equipment; Availability of GNSS/GPS data / CORS data in Nepal

**11. Photogrammetry and Remote Sensing:**

- 11.1. Basics of Photogrammetry; Principles, application, terminologies, types of ariel photographs; types
- 11.2. Planning aerial flight, aerial camera, overlaps, scale, etc.
- 11.3. Distortions, Displacement in photogrammetry and their corrections
- 11.4. Modern Technologies like UAV, LiDAR; basics, techniques and application
- 11.5. Basics of Remote Sensing; Concept; Principles, types,
- 11.6. Image acquisition techniques, types of scanners, source of errors and their removal
- 11.7. Techniques of image data processing and interpretation
- 11.8. Acquiring photographs and satellite images for hydropower projects

**12. Cartography:**

- 12.1. Concept and Scope of cartography
- 12.2. Different Types of Maps
- 12.3. Conventional and digital cartography
- 12.4. Map compilation and production
- 12.5. Map Generalization
- 12.6. Modern map making techniques
- 12.7. Thematic Mapping

**13. Geographical information system (GIS):**

- 13.1. Introduction to GIS and its application
- 13.2. Selection and handling of GIS software; proprietary, open source based, AutoCAD, etc.
- 13.3. GIS component
- 13.4. Data model
- 13.5. Compiling data from different sources
- 13.6. Data processing techniques
- 13.7. GIS operation and spatial analysis
- 13.8. Availability of GIS data required for Hydropower projects in Nepal
- 13.9. Conversion of Raster to Vector and vice-versa

**14. Engineering Surveying:**

- 14.1. Road Survey: Alignment surveying, curve setting, different type of curves, profile surveying, cross section surveying
- 14.2. Transmission line surveying; route surveying, Profile survey of transmission line and distribution line; fixing tower location; angle points; Power line/ Transmission line crossing
- 14.3. Tunnel survey; Alignment of the centerline of the tunnel; Transferring the alignment underground; Transferring the levels under ground

**15. Contract Management:**

- 15.1. Familiarization with Procurement guidelines and standards, including those 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. Power Sector Development and Engineering Economics:**

- 16.1. Potential of hydropower development and Identification of hydropower scheme
- 16.2. Disbursement scheduling, Cash flow analysis, Time value of money
- 16.3. Project evaluation indicators, IRR, Payback period, Choosing the best alternative
- 16.4. Risk analysis, Inflation & price change
- 16.5. Taxation system in Nepal
- 16.6. Energy tariff schemes and regulatory issues

