

# नेपाल विद्युत प्राधिकरण

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

द्वितीय पत्र: सेवा सम्बन्धी बिस्तृत ज्ञान

खण्ड क: (२x१५=३०, १x२०=२०) - ५० अंक

## 1. Fundamentals Of Surveying

- 1.1 Concept, Principles and Disciplines of surveying
- 1.2 Linear measurement techniques
- 1.3 Principle and methods of chain surveying
- 1.4 Types, sources of errors in measurements, precision and accuracy
- 1.5 Principle and methods of plain table surveying
- 1.6 Advantages and disadvantages of plain table surveying
- 1.7 Bearings, types and bearing systems, magnetic declination
- 1.8 Local attraction in compass survey
- 1.9 Compass traversing, computation of bearing, errors and adjustments
- 1.10 Application of surveying in hydropower development
- 1.11 Plotting and Mapping

## 2. Survey Management

- 2.1 Survey team
- 2.2 Terms of reference
- 2.3 Survey design, specification and costing
- 2.4 Equipment
- 2.5 Safety management
- 2.6 Professional ethics, code of conduct
- 2.7 Coordination with institutions

## 3. Levelling

- 3.1 Principle of levelling
- 3.2 Methods of computation of reduced level
- 3.3 Two peg test
- 3.4 Differential levelling, fly levelling, reciprocal levelling
- 3.5 Profile levelling, cross sectioning
- 3.6 Sources of errors in levelling
- 3.7 Errors, precision and adjustment of errors

## 4. Traversing

- 4.1 Measurement of horizontal and vertical angles
- 4.2 Closed traverse and linked traverse
- 4.3 Horizontal and vertical control of traverse
- 4.4 Computation of angles, bearings, latitudes and departures, independent coordinates
- 4.5 Errors, precision and adjustment in angles, bearings and coordinates
- 4.6 Plotting of traverse and topographic map

## 5. Tacheometry

- 5.1 Principle of tacheometry
- 5.2 Stadia method, tangential method and subtense bar method

## 6. Trigonometric Levelling

- 6.1 Determination of height and distances of inaccessible objects
- 6.2 Reciprocal trigonometric levelling

**7. Contouring**

- 7.1 Characteristics of contouring
- 7.2 Method of contouring
- 7.3 Plotting of contours and detailing
- 7.4 Uses of contour maps

**8. Orientation**

- 8.1 Analytical intersection and resection
- 8.2 Two point and three points resection and their significance

**9. Triangulation And Trilateration**

- 9.1 Principles of triangulation and trilateration
- 9.2 Computations and adjustment of triangulation and trilateration

**10. Computation Of Area And Volume**

- 10.1 Area by ordinates, coordinates and double meridian distance method
- 10.2 Volume by average end area, prismoidal formula, trapezoidal rule, and Simpson's 1/3 rule

**11. Photogrammetric And Remote Sensing**

- 11.1 Types of aerial photography
- 11.2 Scale and coverage
- 11.3 Relief displacement
- 11.4 Aerial photo processing
- 11.5 Application of aerial photograph
- 11.6 Concept of remote sensing
- 11.7 Types of remote sensing
- 11.8 Image processing and interpretation
- 11.9 Electromagnetic radiation
- 11.10 Application of remote sensing

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(२x१५=३०, १x२०=२०) - ५० अंक

**12. Global Positioning System (GPS)**

- 12.1 Introduction to space geodesy
- 12.2 Principle of GPS
- 12.3 GPS signals and positioning
- 12.4 Geometric coordinates and WGS 84
- 12.5 GPS data processing

**13. Cartography**

- 13.1 Concept of cartography
- 13.2 Scope of cartography
- 13.3 Conventional and digital cartography
- 13.4 Map compilation and production
- 13.5 Geographic and cartographic scale
- 13.6 Topographic cartography
- 13.7 Data acquisition, processing, analysis, visualization and presentation
- 13.8 Map reproduction, enlargement and reduction

**14. Geographical Information System (GIS)**

- 14.1 Introduction to GIS
- 14.2 GIS component
- 14.3 Data model
- 14.4 GPS data processing
- 14.5 GIS operation and spatial analysis
- 14.6 Geometric coordinates and WGS 84
- 14.7 Application of GIS

**15. Cadastral Surveying**

- 15.1 Cadastral concepts
- 15.2 Principles of cadastral surveying
- 15.3 Cadastral survey methods
- 15.4 Land laws
- 15.5 Land acquisition and compensation

**16. Geodesy**

- 16.1 Coordinate system and star coordinate updating
- 16.2 Mathematical model for latitude, longitude and azimuth
- 16.3 Transformation between local and global system
- 16.4 Celestial system

**17. Plotting And Mapping**

- 17.1 Plotting of topographic map, L-section, Cross - section
- 17.2 Software of plotting and mapping
- 17.3 Mapping for hydropower project

**18. Use Of Survey Instrument**

- 18.1 Plane table, Telescopic alidade, Compass, Level, Theodolite, EDM, Total station, GPS receiver
- 18.2 Aerial camera, process camera, digital camera, scanner, stereo plotter, stereoscope, scribing tools, drawing equipment

**19. Transmission Line Survey**

- 19.1 Route alignment survey of transmission line
- 19.2 Profile survey of transmission line
- 19.3 Tower location
- 19.4 Angle points
- 19.5 Power line/Transmission line crossing

**20. Tunnel Survey**

- 20.1 Alignment of the centerline of the tunnel
- 20.2 Transferring the alignment under ground
- 20.3 Transferring the levels under ground

**21. Digital Mapping**

- 21.1 Capture and handling of digital data
- 21.2 Conversion of raster data to vector and vice-versa
- 21.3 Knowledge of Auto-CAD, Arch-INFO, Arch-VIEW

**22. Construction Survey**

- 22.1 Hydropower station: Intake, reservoir, dam, powerhouse
- 22.2 Road alignment survey: gradient, curve, cutting, filling
- 22.3 Curve: types of curve, setting out of simple circular curve and vertical curve

**23. Contract Management**

- 23.1 Familiarization with Procurement guidelines and standards of World Bank & Asian Development Bank
- 23.2 Preparation of contract documents, specifications, condition of contract and other contractual procedures.
- 23.3 International Standard Bidding Document, National Standard Bidding Document
- 23.4 Arbitration

**24. Engineering Economics**

- 24.1 Disbursement scheduling, Cash flow analysis, Time value of money
- 24.2 Project evaluation indicators, IRR, Payback period, Choosing the best alternative
- 24.3 Risk analysis, Inflation & price change
- 24.4 Taxation system in Nepal
- 24.5 Energy tariff schemes and regulatory issues

