

नेपाली सेना

नेपाली सेना

प्रा.उ.से. सर्भे ईन्जिनियर (खुला) पदको लिखित परीक्षाको पाठ्यक्रम

समय : २ घण्टा ३० मिनेट

पुर्णाङ्क : १००

उत्तीर्णाङ्क : ४०

यो पाठ्यक्रम नेपाली सेनाको विभिन्न ईकाईहरूमा रिक्त रहेको प्रा.उ.से. सर्भे ईन्जिनियर (खुला) पदका उम्मेदवार छनौट परीक्षाको लागि निर्धारण गरिएको हो । लिखित परीक्षामा सरिक हुने उम्मेदवारहरूको पेशा सम्बन्धि विषयलाई आधारमानी प्रश्नहरू सोधिने छ ।

- (क) लिखित परीक्षाको माध्यम नेपाली/अंग्रेजी वा दुवै भाषा हुनेछ ।
- (ख) लिखित परीक्षाबाट छनौट भएका उम्मेदवारहरूलाई मात्र अर्को चरणको परीक्षामा सम्मिलित गराईने छ ।
- (ग) प्रश्न पत्र निर्माण गर्दा पाठ्यक्रममा समावेश भएका सबै विषयहरूलाई समेटिनेछ ।
- (घ) नेपाली सेनाको आवश्यकता तथा विविध परिस्थितमा नेपाली सेना अनुकुल हुने गरी उल्लेखित विवरणहरूमा हेरफेर हुन सक्नेछ ।
- (ङ) पाठ्यक्रमको रूपरेखा देहायमा उल्लेख गरे अनुसार हुनेछ ।
- (च) पाठ्यक्रम लागु मिति २०७३/५/०१ गते ।

लिखित परीक्षा योजना र पाठ्यक्रम

विषय	पुर्णाङ्क	उत्तीर्णाङ्क	परीक्षा प्रणाली		प्रश्न संख्या X अङ्क	समय
पेशा सम्बन्धी	१००	४०	वस्तुगत (Objective)	बहुवैकल्पिक प्रश्न (MCQs)	४० प्रश्न X १ अङ्क = ४०	२ घण्टा ३० मिनेट
			विषयगत (Subjective)	छोटो उत्तर	६ प्रश्न X ५ अङ्क = ३०	
				लामो उत्तर	३ प्रश्न X १० अङ्क = ३०	

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पेशा सम्बन्धी विषयको पाठ्यक्रम

(SYLLABUS FOR SURVEY)

1. Fundamentals of Surveying

1.1 Introduction

- 1.1.1 History of land surveying
- 1.1.2 Objectives
- 1.1.3 Principles of surveying
- 1.1.4 Classification
- 1.1.5 Land measurement Units, Standardization and Conversion
- 1.1.6 Map and Map Scale
- 1.1.7 Methods of surveying
- 1.1.8 Fundamental Measurements in Surveying: Positioning, Linear and Angular
- 1.1.9 Basic terms used in Surveying: For Distance, Direction and Position
- 1.1.10 Coordinates Systems: Geographical, Plane Rectangular and Polar
- 1.1.11 Figure and Shape of Earth: Spheroid and Geoid
- 1.1.12 Representation of Earth's Surface: Projection, Grid, Graticule, Relief
- 1.1.13 Emergence of Geomatics
- 1.1.14 Scope of Geomatics Engineering
- 1.1.15 Land Data and Spatial Referencing
- 1.1.16 Role of International Surveying and Mapping Communities

1.2 Surveying and Mapping Technology

- 1.2.1 Selection, Use, Feasibility, Sustainability, Transfer and Development
- 1.2.2 Instruments, Hardware, Software, Procuring, Maintaining and Upgrading

1.3 Survey Management

- 1.3.1 Surveying Need Assessment
- 1.3.2 Terms of Reference
- 1.3.3 Survey Design, Specification and Costing
- 1.3.4 Checking and Adjusting Instruments
- 1.3.5 Supervision
- 1.3.6 Production
- 1.3.7 Reports
- 1.3.8 Problems of Field Surveying in Nepal
- 1.3.9 Safety Management
- 1.3.10 Professional Ethics, Code and Conduct
- 1.3.11 Community Skill of Surveyor
- 1.3.12 Coordination of Institutional Resources
- 1.3.13 Governmental, Non Governmental and International Non Governmental Organization
- 1.3.14 Public Private Partnership
- 1.3.15 User Groups
- 1.3.16 Public Relations

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1.4 **Statistical Concepts**

- 1.4.1 Introduction and Application
- 1.4.2 Measure of Central Tendency: Mean, Median, Mode, Standard Deviation
- 1.4.3 Variance, Co-Variance
- 1.4.4 Correlation and Regression,
- 1.4.5 Probability, Normal Distribution

1.5 **Error and Adjustments**

- 1.5.1 Introduction
- 1.5.2 Fundamentals of Theory of Measurement Errors
- 1.5.3 Accuracy and Precision
- 1.5.4 Least Square Adjustments
- 1.5.5 Propagation of Errors

2. **Cadastral**

2.1 **Land Registration**

- 2.1.1 Land Rights and Land Records
- 2.1.2 Land Transfers
- 2.1.3 Registration of Deeds
- 2.1.4 Registration of Titles
- 2.1.5 Horizontal Sub division
- 2.1.6 Systematic Adjudication
- 2.1.7 Land Tenure
- 2.1.8 Land Record in Nepal

2.2 **Cadastral Surveying**

- 2.2.1 Cadastral Concepts
- 2.2.2 principles of cadastral Surveying
- 2.2.3 Boundaries
- 2.2.4 Parcel
- 2.2.5 Cadastral Surveys in Nepal
- 2.2.6 Overview of Land related Acts and Rules of Nepal

2.3 **Land Information System (LIS)**

- 2.3.1 Need for LIS
- 2.3.2 Concept of LIS
- 2.3.3 Parcel based LIS: The Multipurpose Cadastre

3. **Geodesy**

3.1 **Control Surveying**

- 3.1.1 Horizontal Controls: Triangulation, Trilateration, Traversing, Intersection, Resection
- 3.1.2 Vertical Controls: Leveling

3.2 **Elementary Geodesy and Astronomy**

- 3.2.1 Concepts
- 3.2.2 Geodetic Datum and Reference Ellipsoid

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- 3.2.3 Gravity Force, Gravity Potential, Measured and Normal Gravity, Gravity Anomaly
- 3.2.4 Coordinate Systems: Spherical, Geodetic and Astronomical Coordinates
- 3.2.5 Transformations of Coordinates
- 3.2.6 Celestial Sphere, Celestial Elements, Astronomical Triangle and Time Systems
- 3.2.7 Astronomical Positioning: Determination of Azimuth, Latitude and Longitude

- 3.3 **Global Positioning System (GPS)**
 - 3.3.1 Introduction to space Geodesy
 - 3.3.2 Principle of Global Positioning System
 - 3.3.3 GPS navigation
 - 3.3.4 GPS Positioning
 - 3.3.5 Static and Kinematic Observations
 - 3.3.6 GPS data processing

- 4. **Engineering Survey**
 - 4.1 **Introduction**
 - 4.1.1 Control and Detail Surveys
 - 4.1.2 Route Surveying-Plan and Profiles
 - 4.1.3 Curves- Types, Geometry, Setting out and Application
 - 4.1.4 Area and Volume
 - 4.2 **Construction Surveys**
 - 4.2.1 Buildings
 - 4.2.2 Pipelines
 - 4.2.3 Roads, Highways and Tunnels
 - 4.2.4 Hydropower-Intake, Reservoir, Dam, Powerhouse
 - 4.2.5 Bridges
 - 4.2.6 Canals
 - 4.2.7 Transmission Lines
 - 4.2.8 Setting out Surveys
 - 4.3 **Hydrographic Surveys**
 - 4.3.1 Discharge
 - 4.3.2 Bathymetric Survey

- 5. **Photogrammetry and Remote Sensing**
 - 5.1 **Introduction**
 - 5.1.1 Basic Principles of Photogrammetry
 - 5.1.2 Definitions of some terms used in Photogrammetry
 - 5.1.3 Photo interpretations
 - 5.2 **Aerial Photography**
 - 5.2.1 Aerial Camera
 - 5.2.2 Types of Aerial Photography

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- 5.2.3 Scale of Aerial Photography
- 5.2.4 Format of the Photograph
- 5.2.5 Flight Planning
- 5.2.6 Aerial Photo Processing
- 5.2.7 Relief Displacement
- 5.2.8 Tilt Displacement
- 5.3 **Binocular Vision**
 - 5.3.1 Stereoscopic Vision
 - 5.3.2 Pseudoscopic Vision
 - 5.3.3 Anaglyph System
 - 5.3.4 Parallax
- 5.4 **Rectification**
 - 5.4.1 Introduction
 - 5.4.2 Conventional Rectification
 - 5.4.3 Differential Rectification
 - 5.4.4 Ortho-photo
 - 5.4.5 Photo-mosaics
- 5.5 **Photo Control**
 - 5.5.1 Selection of Photo Control Points
 - 5.5.2 Pre-marking and Post-marking
 - 5.5.3 Point Transfer
 - 5.5.4 Introduction to aerial Triangulation
- 5.6 **Analogue Photogrammetry**
 - 5.6.1 Introduction to Analogue Plotters
 - 5.6.2 Principles of Stereo Plotters
 - 5.6.3 Orientations: Inner, Relative and Absolute Orientation
 - 5.6.4 Data Acquisition
- 5.7 **Analytical Photogrammetry**
 - 5.7.1 Introduction
 - 5.7.2 Mathematical relationship between image and object space
 - 5.7.3 Spatial Orientation and Measurements
- 5.8 **Digital Photogrammetry**
 - 5.8.1 Introduction and Concepts
 - 5.8.2 Image Acquisition
 - 5.8.3 Processing
 - 5.8.4 Feature Extraction
- 5.9 **Remote Sensing**
 - 5.9.1 Introduction
 - 5.9.2 Brief History of Remote Sensing
 - 5.9.3 Concepts of Satellite Remote Sensing
- 5.10 **Image Processing and Interpretation**
 - 5.10.1 Geo-referencing
 - 5.10.2 Processing: Geometric and Radiometric Processing
 - 5.10.3 Image Interpretation and Analysis

5.10.4 Errors

6. Cartography

6.1 Introduction

- 6.1.1 Historical Background
- 6.1.2 Cartographic Concepts
- 6.1.3 Conventional and Digital Cartography
- 6.1.4 Map Production: Map Compilation and Map Reproduction
- 6.1.5 Topographic Cartography: Large Scale and Base Map
- 6.1.6 Small Scale mapping
- 6.1.7 Thematic Cartography

6.2 Geo Information

- 6.2.1 Data (Geometric and Attribute)
- 6.2.2 Information
- 6.2.3 Information System
- 6.2.4 Geographical Information System (GIS)
- 6.2.5 Database (Basic Concepts, Design and Principles)

6.3 Data Acquisition, Processing, Analysis, Visualization and Presentation (Conventional and Digital Environments)

- 6.3.1 Data Acquisition
 - 6.3.1.1 Data Sources
 - 6.3.1.2 Toponymy
 - 6.3.1.3 Digitization
- 6.3.2 Data Processing
 - 6.3.2.1 Geo-referencing
 - 6.3.2.2 Map Projection (Introduction, Classification, Choice and Uses)
 - 6.3.2.3 Data Integration
 - 6.3.2.4 Editing, Spatial Relationship and Topology building
 - 6.3.2.5 Spatial Analysis (Merge, Buffer Overly)
 - 6.3.2.6 Attribute Database (Topographic and Thematic)
- 6.3.3 Visualization and Presentation
 - 6.3.3.1 Spatial and Attribute data
 - 6.3.3.2 Statistical Surface
 - 6.3.3.3 Classification of Data
 - 6.3.3.4 Measurement Level of Data (Nominal, Ordinal, Interval and Ratio)
 - 6.3.3.5 Map design (Principles)
 - 6.3.3.6 Symbolization and Generalization
 - 6.3.3.7 Graphic Variables
 - 6.3.3.8 Typography
 - 6.3.3.9 Map in and for www (Web Cartography)
- 6.3.4 Map Reproduction
 - 6.3.4.1 Map Reproduction in Conventional Environment
 - 6.3.4.2 Map Reproduction in Digital Environment

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7. Spatial Information System and Digital Terrain Model

- 7.1 Data Structure, Spatial-Non Spatial Data Source
 - 7.1.1 Vector Data and Raster Data
 - 7.1.2 Resolution of Raster Image
 - 7.1.3 Object oriented Vector Data
 - 7.1.4 Topological Vector Data
 - 7.1.5 Data Integration
- 7.2 Spatial Database Management
 - 7.2.1 Introduction
 - 7.2.2 Data Modeling
 - 7.2.3 Database Design and Maintenance
 - 7.2.4 Storage and Archives, Data Security
- 7.3 Data Standards and Quality
 - 7.3.1 Data/Metadata standards: Standardization Format and Accuracy
 - 7.3.2 Data quality Administration
 - 7.3.3 Copyright
- 7.4 Geographical Information System (GIS)
 - 7.4.1 Introduction to GIS
 - 7.4.2 GIS components
 - 7.4.3 Data Model
 - 7.4.4 GIS Operations and Spatial Analysis
- 7.5 National Spatial Database Infrastructure
 - 7.5.1 Metadata
 - 7.5.2 Data Sharing
 - 7.5.3 Clearinghouse
 - 7.5.4 Spatial Information Service
- 7.6 Digital Terrain Model (DTM)
 - 7.6.1 Introduction
 - 7.6.2 Data Collection, Processing and Creation of DTM
 - 7.6.3 Storage and Presentation: TIN, Grid and Contours
 - 7.6.4 Resolution, Error and Implications
 - 7.6.5 Application: Flythrough, Viewshed, Overlay
- 7.7 Information Communication Technology (ICT) Applications
 - 7.7.1 Introduction to Web and Internet
 - 7.7.2 Data dissemination through web
 - 7.7.3 Web Maps: Static, Dynamic and Interactive
- 7.8 Global Map

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यस पेशा सम्बन्धी विषयको पाठ्यक्रमका एकाईहरूबाट सोधिने प्रश्नहरूको संख्या निम्नानुसार हुनेछ ।

एकाई नं. (Unit No.)	अङ्कभार (Weightage)	बहुवैकल्पिक प्रश्न (MCQs) को संख्या	छोटो उत्तर प्रश्नको संख्या	लामो उत्तर प्रश्नको संख्या
१	२०	१०	६ प्रश्न X ५ अङ्क	३ प्रश्न X १० अङ्क
२	२०	१०		
३				
४	३०	१०		
५				
६	३०	१०		
७				
जम्मा	१००	४० प्रश्न x १ अङ्क = ४० अङ्क	६ प्रश्न X ५ अङ्क = ३० अङ्क	३ प्रश्न X १० अङ्क = ३० अङ्क