

प्रदेश लोक सेवा आयोग, प्रदेश नं.२
इञ्जिनियरिङ्ग सेवा, सर्भे समूह, अधिकृत सातौं तहको नापी अधिकृत पदको खुला तथा अन्तर सेवा
प्रतियोगितात्मक परीक्षाको पाठ्यक्रम

यस पाठ्यक्रम योजनालाई दुई चरणमा विभाजन गरिएको छ :

प्रथम चरण :-	लिखित परीक्षा (Written Examination)	पूर्णाङ्क :- २००
द्वितीय चरण :-	(क) सामूहिक परीक्षण (Group Test)	पूर्णाङ्क :- १०
	(ख) अन्तर्वार्ता (Interview)	पूर्णाङ्क :- ३०

परीक्षा योजना (Examination Scheme)

प्रथम चरण : लिखित परीक्षा(Written Examination)

पूर्णाङ्क :- २००

पत्र	विषय	खण्ड	पूर्णाङ्क	उत्तीर्णाङ्क	परीक्षा प्रणाली		पश्नसंख्या × अङ्क	समय
प्रथम	General Subject	Part I: General Awareness & General Ability Test	१००	४०	वस्तुगत (Objective)	बहुवैकल्पिक प्रश्न (MCQs)	५० प्रश्न × १ अङ्क	१ घण्टा ३० मिनेट
		Part II: General Technical Subject					५० प्रश्न × १ अङ्क	
द्वितीय	Technical Subject		१००	४०	विषयगत (Subjective)	छोटो उत्तर लामो उत्तर	४ प्रश्न × ५ अङ्क ८ प्रश्न × १० अङ्क	३ घण्टा

द्वितीय चरण : सामूहिक परीक्षण (Group Test) र अन्तर्वार्ता (Interview)

पूर्णाङ्क :- ४०

पत्र / विषय	पूर्णाङ्क	उत्तीर्णाङ्क	परीक्षा प्रणाली	समय
सामूहिक परीक्षण (Group Test)	१०		सामूहिक छलफल (Group Discussion)	३० मिनेट
अन्तर्वार्ता (Interview)	३०		बोर्ड अन्तर्वार्ता(Board Interview)	-

द्रष्टव्य :

- लिखित परीक्षाको माध्यम भाषा नेपाली वा अंग्रेजी अथवा नेपाली र अंग्रेजी दुवै हुनेछ ।
- प्रथमपत्र र द्वितीय पत्रको लिखित परीक्षा छुट्टाछुट्टै हुनेछ ।
- वस्तुगत बहुवैकल्पिक (Multiple Choice) प्रश्नहरूको गलत उत्तर दिएमा प्रत्येक गलत उत्तर बापत २० प्रतिशत अङ्क कट्टा गरिनेछ । तर उत्तर नदिएमा त्यस बापत अङ्क दिइने छैन र अङ्क कट्टा पनि गरिने छैन ।
- बहुवैकल्पिक प्रश्नहरू हुने परीक्षामा कुनै प्रकारको क्याल्कुलेटर (Calculator) प्रयोग गर्न पाइने छैन ।
- विषयगत प्रश्नहरूको हकमा तोकिएको अंकका एउटा लामो प्रश्न वा एउटा प्रश्नको दुई वा दुई भन्दा बढी भाग (Two or more parts of a single question) वा एउटा प्रश्न अन्तर्गत दुई वा बढी टिप्पणीहरू (Short notes) सोध्न सकिने छ ।
- द्वितीय पत्रमा (विषयगत प्रश्न हुनेका हकमा) प्रत्येक खण्डका लागि छुट्टाछुट्टै उत्तरपुस्तिकाहरू हुनेछन् । परीक्षार्थीले प्रत्येक खण्डको प्रश्नहरूको उत्तर सोहीखण्डको उत्तरपुस्तिकामा लेख्नुपर्नेछ ।
- यस पाठ्यक्रम योजना अन्तर्गतका पत्र/विषयका विषयवस्तुमा जेसुकै लेखिएको भए तापनि पाठ्यक्रममा परेका कानून, ऐन, नियम तथा नीतिहरू परीक्षाका मिति भन्दा ३ महिना अगाडि (संशोधन भएका वा संशोधन भइ हटाईएका वा थप गरी संशोधन भई) कायम रहेकालाई यस पाठ्यक्रममा परेको सम्झनु पर्दछ ।
- प्रथमचरणको परीक्षाबाट छनौट भएको उम्मेदवारहरूलाई मात्र द्वितीयचरणको परीक्षामा सम्मिलित गराइनेछ ।
- पाठ्यक्रम लागु मिति : २०७८।०३।३० गते देखी ।

प्रथम पत्र (Paper I): General Subject

Part (I) : - General Awareness & General Ability Test (50 Marks)

1. **General Awareness and Contemporary Issues** (25 ×1 Mark = 25 Marks)
 - 1.1 Physical, socio-cultural and economic geography and demography of Nepal
 - 1.2 Major natural resources of Nepal
 - 1.3 Geographical diversity, climatic conditions, and livelihood & lifestyle of people
 - 1.4 Notable events and personalities, social, cultural and economic conditions in modern history of Nepal
 - 1.5 Current periodical plan of Nepal
 - 1.6 Information on sustainable development, environment, pollution, climate change, biodiversity, science and technology
 - 1.7 Nepal's international affairs and general information on the UNO, SAARC & BIMSTEC
 - 1.8 The Constitution of Nepal (From Part 1 to 5 and Schedules)
 - 1.9 Governance system and Government (Federal, Provincial and Local)
 - 1.10 Provisions of civil service act and regulation relating to constitution of civil service, organisational structure, posts of service, fulfillment of vacancy and code of conduct
 - 1.11 Functional scope of public services
 - 1.12 Public Service Charter
 - 1.13 Concept, objective and importance of public policy
 - 1.14 Fundamentals of management : planning, organizing, directing, controlling, coordinating, decision making, motivation and leadership
 - 1.15 Government planning, budgeting and accounting system
 - 1.16 Major events and current affairs of national and international importance
 - 1.17 Province no.2, Province Civil Service Act, 2077
2. **General Ability Test** (25 ×1 Mark = 25 Marks)
 - 2.1 **Verbal Ability Test** (8×1 Mark = 8 Marks)

Jumble words, Series, Analogy, Classification, Coding-Decoding, Matrix, Ranking Order Test, Direction and Distance Sense Test, Common Sense Test, Logical Reasoning, Assertion and Reason, Statement and Conclusions
 - 2.2 **Numerical Ability Test** (9×1 Mark = 9Marks)

Series, Analogy, Classification, Coding, Arithmetical reasoning/operation, Percentage, Ratio, Average, Loss & Profit, Time & Work, Data interpretation & Data verification
 - 2.3 **Non-verbal/Abstract Ability Test** (8×1 Mark = 8 Marks)

Figure Series, Figure Analogy, Figure Classification, Figure Matrix, Pattern Completion/Finding, Analytical Reasoning Test, Figure Formation and Analysis, Rule Detection, Water images, Mirror images, Cubes and Dice & Venn-diagram

Part (II) : - General Technical Subject (50 Marks)

Section A – 30 % Marks

1. Fundamentals of Surveying

1.1 Introduction

- 1.1.1 Historical Background
- 1.1.2 Objectives
- 1.1.3 Principles of surveying
- 1.1.4 Classification
- 1.1.5 Linear and Angular Measurements
- 1.1.6 Survey computations: Bearing, Coordinates, Reduced Level, Area & Volume
- 1.1.7 Units, Standardization and Conversion
- 1.1.8 Application of Surveying
- 1.1.9 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 Tasks, Identification and distribution
- 1.3.5 Tools, Equipment and accessories
- 1.3.6 Checking and Adjusting Instruments
- 1.3.7 Supervision
- 1.3.8 Production
- 1.3.9 Reports
- 1.3.10 Problems of Field Surveying in Nepal
- 1.3.11 Safety Management
- 1.3.12 Professional Ethics, Code and Conduct
- 1.3.13 Community Skill of Surveyor
- 1.3.14 Coordination of Institutional Resources
- 1.3.15 Governmental, Non Governmental and International Non Governmental Organization
- 1.3.16 Public Private Partnership
- 1.3.17 User Groups
- 1.3.18 Public Relations

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. Cadastre

2.1 Land Registration

- 2.2.1 Land Rights and Land Records
- 2.2.2 Land Transfers
- 2.2.3 Registration of Deeds
- 2.2.4 Registration of Titles
- 2.2.5 Fragmentation and Consolidation
- 2.2.6 Horizontal Sub division
- 2.2.7 Systematic Adjudication
- 2.2.8 Land Tenure
- 2.2.9 Land Record in Nepal
- 2.2.10 Land Registries

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 Survey Methods
- 2.2.6 Cadastral System
- 2.2.7 Cadastral Interface
- 2.2.8 Maintenance of cadastre
- 2.2.9 Land Laws
- 2.2.10 Cadastral Surveys in Nepal

2.3 Land Management

- 2.3.1 Principles of Management
- 2.3.2 Cadastral Organization
- 2.3.3 Land Development Planning
- 2.3.4 Financial Aspects
- 2.3.5 Land Use
- 2.3.6 Land Management
- 2.3.7 GIS Applications
- 2.3.8 Land Administration
- 2.3.9 Overview of Land related Acts and Rules of Nepal
- 2.3.10 Province no.2, Land and Agriculture related Act, Rule and Regulation
- 2.3.11 Province no.2, Land and Agriculture related Plan and Policies .

2.4 Land Information System (LIS)

- 2.4.1 Need for LIS
- 2.4.2 Concept of LIS
- 2.4.3 Need for coordination: Structure
- 2.4.4 Parcel based LIS: The Multipurpose Cadastre
- 2.4.5 The Economics of LIS

Section B – 20% Marks

3. Geodesy

3.1 Introduction to Control Surveying

- 3.1.1 Horizontal Controls
- 3.1.2 Vertical Controls

3.2 Methods of Control Surveying

- 3.2.1 Leveling: Geodetic and Ordinary Leveling
- 3.2.2 Triangulation and Trilateration: Principle, Figure and Strength, Procedures, Computation

- 3.2.3 Traversing: Principle, Procedures, Computation
- 3.2.4 Intersection and Resection: Importance, Procedures, Computation
- 3.3 Elementary Geodesy and Astronomy
 - 3.3.1 Concepts
 - 3.3.2 Geodetic Datum and Reference Ellipsoid, Deflection of Vertical, Laplace Equation
 - 3.3.3 Coordinate Systems: Spherical, Geodetic and Astronomical Coordinates
 - 3.3.4 Transformations of Coordinates and Datum Transformation
 - 3.3.5 Celestial Sphere, Celestial Elements, Astronomical Triangle and Time Systems
 - 3.3.6 Astronomical Positioning: Determination of Azimuth, Latitude and Longitude
- 3.4 Physical Geodesy
 - 3.4.1 Concepts
 - 3.4.2 Gravity Force, Gravity Potential, Measured and Normal Gravity, Gravity Anomaly
 - 3.4.3 Equipotential Surface, Orthometric Height and Dynamic Height
 - 3.4.4 Absolute and Relative Gravimeters
- 3.5 Global Positioning System
 - 3.5.1 Introduction to Space Geodesy
 - 3.5.2 Principle of Global Positioning System (GPS)
 - 3.5.3 GPS Signals
 - 3.5.4 Satellite Geometry and Accuracy
 - 3.5.5 GPS Positioning
 - 3.5.6 Static and Kinematic Observations
 - 3.5.7 Geocentric Coordinates and WGS 84
 - 3.5.8 GPS Data Processing

Section C – 20% Marks

4. Photogrammetry and Remote Sensing

- 4.1 Introduction
 - 4.1.1 Basic Principles of Photogrammetry
 - 4.1.2 Definitions of some terms used in Photogrammetry
- 4.2 Aerial Camera
 - 4.2.1 Introduction
 - 4.2.2 Parts of Aerial Camera
 - 4.2.3 Types of Camera
 - 4.2.4 Characteristics of Aerial Camera
- 4.3 Aerial Photography
 - 4.3.1 Types of Aerial Photography
 - 4.3.2 Scale of Aerial Photography
 - 4.3.3 Format of the Photograph
 - 4.3.4 Flight Planning
 - 4.3.5 Aerial Photo Processing
 - 4.3.6 Relief Displacement
 - 4.3.7 Tilt Displacement
- 4.4 Binocular Vision
 - 4.4.1 Stereoscopic Vision
 - 4.4.2 Pseudoscopic Vision
 - 4.4.3 Anaglyph System

- 4.4.4 Parallax
- 4.5 Photo Interpretations
 - 4.5.1 Steps in Photo Interpretation
 - 4.5.2 Elements of Photo Interpretation
- 4.6 Rectification
 - 4.6.1 Introduction
 - 4.6.2 Conventional Rectification
 - 4.6.3 Differential Rectification
 - 4.6.4 Ortho-photo
 - 4.6.5 Photo-mosaics
- 4.7 Photo Control and Aerial Triangulation
 - 4.7.1 Selection of Photo Control Points
 - 4.7.2 Pre-marking and Post-marking
 - 4.7.3 Point Transfer
 - 4.7.4 Introduction to aerial Triangulation
 - 4.7.5 Phases of Aerial Triangulation
 - 4.7.6 Methods of Aerial Triangulation Adjustment
- 4.8 Analogue Photogrammetry
 - 4.8.1 Introduction to Analogue Plotters
 - 4.8.2 Types of Stereo Plotters
 - 4.8.3 Principles of Stereo Plotters
 - 4.8.4 Orientations: Inner, Relative and Absolute Orientation
 - 4.8.5 Data Acquisition
- 4.9 Analytical Photogrammetry
 - 4.9.1 Introduction
 - 4.9.2 Mathematical relationship between image and object space
 - 4.9.3 Spatial Orientation and Measurements
- 4.10 Digital Photogrammetry
 - 4.10.1 Introduction and Concepts
 - 4.10.2 Image Acquisition
 - 4.10.3 Processing
 - 4.10.4 Feature Extraction
- 4.11 Remote Sensing
 - 4.11.1 Introduction
 - 4.11.2 Brief History of Remote Sensing
 - 4.11.3 Concepts of Satellite Remote Sensing
- 4.12 Image Processing and Interpretation
 - 4.12.1 Geo-referencing
 - 4.12.2 Processing: Geometric and Radiometric Processing
 - 4.12.3 Image Interpretation and Analysis
 - 4.12.4 Errors
- 5. Engineering Survey**
 - 5.1 Introduction
 - 5.1.1 Control and Detail Surveys
 - 5.1.2 Route Surveying-Plan and Profiles
 - 5.1.3 Curves- Types, Geometry Setting out and Application
 - 5.1.4 Area and Volume
 - 5.2 Construction Surveys
 - 5.2.1 Buildings

- 5.2.2 Pipelines
- 5.2.3 Roads and Highways
- 5.2.4 Tunnels
- 5.2.5 Hydropower-Intake, Reservoir, Dam, Powerhouse
- 5.2.6 Bridges
- 5.2.7 Canals
- 5.2.8 Transmission Lines
- 5.2.9 Setting out Surveys
- 5.3 Hydrographic Surveys
 - 5.3.1 Discharge
 - 5.3.2 Bathymetric Survey

Section D – 30 % Marks

6. Cartography

6.1 Introduction

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

6.2 Geo Information

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

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

- 6.3.1 Data Acquisition: Data Sources- Maps, Records (Tables, Texts), Digital Data, Ground Surveys, GPS, Aerial Photography, Satellite Imagery, Documents; Toponymy; Digitization
- 6.3.2 Data Processing: Geo-referencing; Map Projection (Introduction, Classification, Choice and Uses); Data Integration; Editing, Spatial Relationship and Topology; Spatial Analysis (Merge, Buffer Overlay); Attribute Database (Topographic and Thematic)
- 6.3.3 Visualization and Presentation: Spatial and Attribute data; Statistical Surface; Classification of Data; Measurement Level of Data (Nominal, Ordinal, Interval and Ratio); Map design (Principles); Mapping Methods -Symbols; Generalization – conceptual and graphical; Graphic Variables; Typography- Map in and for www (Web Cartography)

6.4 Map Reproduction

- 6.4.1 Map Reproduction in Conventional Environment - Photography, Copying and Printing
- 6.4.2 Map Reproduction in Digital Environment

7. Spatial Information System and Digital Terrain Model (SIS and DTM)

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 6.2.4 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: Triangulated Irregular Network (TIN), Grid and Contours
 - 7.6.4 Resolution, Error and Implications
 - 7.6.5 Application: Flythrough, View shed, Overlay
- 7.7 Global Mapping
- 7.8 Information Communication Technology (ICT) Applications
 - 7.8.1 Introduction to Web and Internet
 - 7.8.2 Client server computing
 - 7.8.3 Data dissemination through web
 - 7.8.4 Web Maps: Static, Dynamic and Interactive

द्वितीय पत्र (Paper II): Technical Subject

Section A – 30 Marks

1. Fundamentals of Surveying

1.1 Introduction

- 1.1.1 Historical Background
- 1.1.2 Objectives
- 1.1.3 Principles of surveying
- 1.1.4 Classification
- 1.1.5 Linear and Angular Measurements
- 1.1.6 Survey computations: Bearing, Coordinates, Reduced Level, Area & Volume
- 1.1.7 Units, Standardization and Conversion
- 1.1.8 Application of Surveying
- 1.1.9 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 Tasks, Identification and distribution
- 1.3.5 Tools, Equipment and accessories
- 1.3.6 Checking and Adjusting Instruments
- 1.3.7 Supervision
- 1.3.8 Production
- 1.3.9 Reports
- 1.3.10 Problems of Field Surveying in Nepal
- 1.3.11 Safety Management
- 1.3.12 Professional Ethics, Code and Conduct
- 1.3.13 Community Skill of Surveyor
- 1.3.14 Coordination of Institutional Resources
- 1.3.15 Governmental, Non Governmental and International Non Governmental Organization
- 1.3.16 Public Private Partnership
- 1.3.17 User Groups
- 1.3.18 Public Relations

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. Cadastre

2.1 Land Registration

- 2.2.1 Land Rights and Land Records
- 2.2.2 Land Transfers
- 2.2.3 Registration of Deeds
- 2.2.4 Registration of Titles
- 2.2.5 Fragmentation and Consolidation
- 2.2.6 Horizontal Sub division
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- 2.2.1 Cadastral Concepts
- 2.2.2 Principles of cadastral Surveying
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- 2.2.4 Parcel
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- 2.2.7 Cadastral Interface
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- 2.2.9 Land Laws
- 2.2.10 Cadastral Surveys in Nepal

2.3 Land Management

- 2.3.1 Principles of Management
- 2.3.2 Cadastral Organization
- 2.3.3 Land Development Planning
- 2.3.4 Financial Aspects
- 2.3.5 Land Use
- 2.3.6 Land Management
- 2.3.7 GIS Applications
- 2.3.8 Land Administration
- 2.3.9 Overview of Land related Acts and Rules of Nepal

2.4 Land Information System (LIS)

- 2.4.1 Need for LIS
- 2.4.2 Concept of LIS
- 2.4.3 Need for coordination: Structure
- 2.4.4 Parcel based LIS: The Multipurpose Cadastre
- 2.4.5 The Economics of LIS

Section B – 20 Marks

3. Geodesy

3.1 Introduction to Control Surveying

- 3.1.1 Horizontal Controls
- 3.1.2 Vertical Controls

3.2 Methods of Control Surveying

- 3.2.1 Leveling: Geodetic and Ordinary Leveling
- 3.2.2 Triangulation and Trilateration: Principle, Figure and Strength, Procedures, Computation

- 3.2.3 Traversing: Principle, Procedures, Computation
- 3.2.4 Intersection and Resection: Importance, Procedures, Computation
- 3.3 Elementary Geodesy and Astronomy
 - 3.3.1 Concepts
 - 3.3.2 Geodetic Datum and Reference Ellipsoid, Deflection of Vertical, Laplace Equation
 - 3.3.3 Coordinate Systems: Spherical, Geodetic and Astronomical Coordinates
 - 3.3.4 Transformations of Coordinates and Datum Transformation
 - 3.3.5 Celestial Sphere, Celestial Elements, Astronomical Triangle and Time Systems
 - 3.3.6 Astronomical Positioning: Determination of Azimuth, Latitude and Longitude
- 3.4 Physical Geodesy
 - 3.4.1 Concepts
 - 3.4.2 Gravity Force, Gravity Potential, Measured and Normal Gravity, Gravity Anomaly
 - 3.4.3 Equipotential Surface, Orthometric Height and Dynamic Height
 - 3.4.4 Absolute and Relative Gravimeters
- 3.5 Global Positioning System
 - 3.5.1 Introduction to Space Geodesy
 - 3.5.2 Principle of Global Positioning System (GPS)
 - 3.5.3 GPS Signals
 - 3.5.4 Satellite Geometry and Accuracy
 - 3.5.5 GPS Positioning
 - 3.5.6 Static and Kinematic Observations
 - 3.5.7 Geocentric Coordinates and WGS 84
 - 3.5.8 GPS Data Processing

Section C – 20 Marks

4. Photogrammetry and Remote Sensing

- 4.1 Introduction
 - 4.1.1 Basic Principles of Photogrammetry
 - 4.1.2 Definitions of some terms used in Photogrammetry
- 4.2 Aerial Camera
 - 4.2.1 Introduction
 - 4.2.2 Parts of Aerial Camera
 - 4.2.3 Types of Camera
 - 4.2.4 Characteristics of Aerial Camera
- 4.3 Aerial Photography
 - 4.3.1 Types of Aerial Photography
 - 4.3.2 Scale of Aerial Photography
 - 4.3.3 Format of the Photograph
 - 4.3.4 Flight Planning
 - 4.3.5 Aerial Photo Processing
 - 4.3.6 Relief Displacement
 - 4.3.7 Tilt Displacement
- 4.4 Binocular Vision
 - 4.4.1 Stereoscopic Vision
 - 4.4.2 Pseudoscopic Vision
 - 4.4.3 Anaglyph System

- 4.4.4 Parallax
- 4.5 Photo Interpretations
 - 4.5.1 Steps in Photo Interpretation
 - 4.5.2 Elements of Photo Interpretation
- 4.6 Rectification
 - 4.6.1 Introduction
 - 4.6.2 Conventional Rectification
 - 4.6.3 Differential Rectification
 - 4.6.4 Ortho-photo
 - 4.6.5 Photo-mosaics
- 4.7 Photo Control and Aerial Triangulation
 - 4.7.1 Selection of Photo Control Points
 - 4.7.2 Pre-marking and Post-marking
 - 4.7.3 Point Transfer
 - 4.7.4 Introduction to aerial Triangulation
 - 4.7.5 Phases of Aerial Triangulation
 - 4.7.6 Methods of Aerial Triangulation Adjustment
- 4.8 Analogue Photogrammetry
 - 4.8.1 Introduction to Analogue Plotters
 - 4.8.2 Types of Stereo Plotters
 - 4.8.3 Principles of Stereo Plotters
 - 4.8.4 Orientations: Inner, Relative and Absolute Orientation
 - 4.8.5 Data Acquisition
- 4.9 Analytical Photogrammetry
 - 4.9.1 Introduction
 - 4.9.2 Mathematical relationship between image and object space
 - 4.9.3 Spatial Orientation and Measurements
- 4.10 Digital Photogrammetry
 - 4.10.1 Introduction and Concepts
 - 4.10.2 Image Acquisition
 - 4.10.3 Processing
 - 4.10.4 Feature Extraction
- 4.11 Remote Sensing
 - 4.11.1 Introduction
 - 4.11.2 Brief History of Remote Sensing
 - 4.11.3 Concepts of Satellite Remote Sensing
- 4.12 Image Processing and Interpretation
 - 4.12.1 Geo-referencing
 - 4.12.2 Processing: Geometric and Radiometric Processing
 - 4.12.3 Image Interpretation and Analysis
 - 4.12.4 Errors
- 5. Engineering Survey**
 - 5.1 Introduction
 - 5.1.1 Control and Detail Surveys
 - 5.1.2 Route Surveying-Plan and Profiles
 - 5.1.3 Curves- Types, Geometry Setting out and Application
 - 5.1.4 Area and Volume
 - 5.2 Construction Surveys
 - 5.2.1 Buildings

- 5.2.2 Pipelines
- 5.2.3 Roads and Highways
- 5.2.4 Tunnels
- 5.2.5 Hydropower-Intake, Reservoir, Dam, Powerhouse
- 5.2.6 Bridges
- 5.2.7 Canals
- 5.2.8 Transmission Lines
- 5.2.9 Setting out Surveys
- 5.3 Hydrographic Surveys
 - 5.3.1 Discharge
 - 5.3.2 Bathymetric Survey

Section D – 30 Marks

6. Cartography

6.1 Introduction

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

6.2 Geo Information

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

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

- 6.3.1 Data Acquisition: Data Sources- Maps, Records (Tables, Texts), Digital Data, Ground Surveys, GPS, Aerial Photography, Satellite Imagery, Documents; Toponymy; Digitization
- 6.3.2 Data Processing: Geo-referencing; Map Projection (Introduction, Classification, Choice and Uses); Data Integration; Editing, Spatial Relationship and Topology; Spatial Analysis (Merge, Buffer Overlay); Attribute Database (Topographic and Thematic)
- 6.3.3 Visualization and Presentation: Spatial and Attribute data; Statistical Surface; Classification of Data; Measurement Level of Data (Nominal, Ordinal, Interval and Ratio); Map design (Principles); Mapping Methods -Symbols; Generalization – conceptual and graphical; Graphic Variables; Typography-Map in and for www (Web Cartography)

6.4 Map Reproduction

- 6.4.1 Map Reproduction in Conventional Environment - Photography, Copying and Printing
- 6.4.2 Map Reproduction in Digital Environment

7. Spatial Information System and Digital Terrain Model (SIS and DTM)

- 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 6.2.4 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: Triangulated Irregular Network (TIN), Grid and Contours
 - 7.6.4 Resolution, Error and Implications
 - 7.6.5 Application: Flythrough, View shed, Overlay
- 7.7 Global Mapping
- 7.8 Information Communication Technology (ICT) Applications
 - 7.8.1 Introduction to Web and Internet
 - 7.8.2 Client server computing
 - 7.8.3 Data dissemination through web
 - 7.8.4 Web Maps: Static, Dynamic and Interactive

प्रदेश लोक सेवा आयोग, प्रदेश नं.२
इञ्जिनियरिङ्ग सेवा, सर्भे समूह, अधिकृत सातौं तह, नापी अधिकृत पदको खुला तथा अन्तर सेवा
प्रतियोगितात्मक परीक्षाको पाठ्यक्रम

इञ्जिनियरिङ्ग सेवाका विभिन्न समूह/उपसमूह, अधिकृत सातौं तहको पदमा प्रथम चरणको लिखित परीक्षाबाट
छनौट भएका उम्मेदवारहरुलाई मात्र लिइने सामूहिक परीक्षण (**Group Test**) को लागि

सामूहिक छलफल (**Group Discussion**)

यस प्रयोजनका लागि गरिने परीक्षण १० पूर्णाङ्क र ३० मिनेट अवधिको हुनेछ जुन नेता विहिन सामूहिक
छलफल (Leaderless Group Discussion) का रुपमा अवलम्बन गरिने छ । दिइएका प्रश्न वा Topic का
विषयमा पालैपालोसँग निर्दिष्ट समय भित्र समूह बीच छलफल गर्दै प्रत्येक उम्मेदवारले व्यक्तिगत प्रस्तुति
(Individual Presentation) गर्नु पर्नेछ । यस परीक्षणमा मूल्याङ्कनका लागि ३ जना भन्दा बढीको समिति
रहनेछ ।