

**लोक सेवा आयोग**  
**नेपाल इञ्जिनियरिङ्ग सेवा, सिभिल समूह, बिल्डिङ्ग एण्ड आर्किटेक्ट उप-समूह,**  
**राजपत्र अनङ्कित प्रथम श्रेणीको खुला प्रतियोगितामत्क**  
**लिखित परीक्षाको पाठ्यक्रम**

यस पाठ्यक्रमलाई दुई भागमा विभाजन गरिएको छ ।

भाग	परीक्षा	विषय	पूर्णाङ्क	प्रश्न संख्या	समय	परीक्षा प्रणाली	उत्तीर्णाङ्क
१	लिखित	सेवा सम्बन्धी	१००	५०	४५ मिनेट	वस्तुगत बहुउत्तर (Multiple Choice)	४०
२	अन्तर्वार्ता		२०				

१. पाठ्यक्रमका एकाईवाट निम्नानुसार प्रश्नहरु सोधिनेछन् ।

Part	I Civil Engineering				II Building				III Architecture		
	१	२	३	४	५	६	७	८	९	१०	११
एकाई											
प्रश्न संख्या	५	७	५	७	३	२	५	३	७	२	४

२. लिखित परीक्षामा गल्ती गरेको प्रश्नोत्तरका लागि २० प्रतिशत अङ्क कट्टा गरिने छ ।
३. यस पाठ्यक्रममा जेसुकै लेखिएको भएता पनि पाठ्यक्रममा परेका ऐन, नियमहरु परीक्षाको मिति भन्दा ३ महिना अगाडि (संशोधन भएका वा संशोधन भई हटाइएका वा थप गरी संशोधन भई) कायम रहेकालाई यस पाठ्यक्रममा परेको सम्झनु पर्दछ ।
४. पाठ्यक्रम लागू हुने मिति २०६४ । ११ ।२

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## **Part I      Civil Engineering**

### **1.      Drawing**

- 1.1      General
  - 1.1.1    Importance, aims and objectives of drawing
  - 1.1.2    Drawing equipments
  - 1.1.3    Architectural discipline
  - 1.1.4    Standard drawing sheets sizes
  - 1.1.5    Drafting techniques and methods in common practice
  - 1.1.6    Scales: Choice, use and conversion
- 1.2      Measured Drawing
  - 1.2.1    Methods of measurement of horizontal and vertical dimensions
  - 1.2.2    Sectional measurements
  - 1.2.3    Dimensioning of sketches
  - 1.2.4    Checking for missing details in field
- 1.3      Working Drawing
  - 1.3.1    Role of working drawing
  - 1.3.2    Interrelationship with estimate and specification
  - 1.3.3    Construction detailing in plan and section
  - 1.3.4    Significance of detailing in terms of accuracy of estimation, bill of quantities and construction supervision
  - 1.3.5    Working drawing for private and public buildings, sanitary installation, electrification
  - 1.3.6    Structural working drawings

### **2.      Estimating and Costing**

- 2.1      General
  - 2.1.1    Purpose of estimating
  - 2.1.2    Main items of work
  - 2.1.3    Units of measurement and payment of various items of work and materials
  - 2.1.4    Degree of accuracy
  - 2.1.5    Standard estimate formats of Government of Nepal
  - 2.1.6    Data for estimate
  - 2.1.7    Preliminary estimate
  - 2.1.8    Approximate quantity estimate
  - 2.1.9    Detailed estimate
  - 2.1.10   Revised estimate
- 2.2      Rate Analysis
  - 2.2.1    Manufactures' cost
  - 2.2.2    Transportation cost
  - 2.2.3    Overheads
  - 2.2.4    Need for contingencies
  - 2.2.5    Use of Government Rate Analysis Norms
- 2.3      Specifications
  - 2.3.1    Purpose
  - 2.3.2    Types
  - 2.3.3    Necessity
  - 2.3.4    Interpretation of Specifications

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- 2.4 Estimating
  - 2.4.1 Earthwork
  - 2.4.2 Estimate of buildings
  - 2.4.3 Estimate of sanitary installations
  - 2.4.4 Estimate of electrical wiring and sanitary works
  - 2.4.5 Annual maintenance
- 2.5 Valuation
  - 2.5.1 Purpose of valuation
  - 2.5.2 Methods of valuation
  - 2.5.3 Standard formats used for Property Valuation in Nepal

### 3. Management

- 3.1 Organization
  - 3.1.1 Need for organization
  - 3.1.2 Building agencies
  - 3.1.3 Structure of the Department of Urban Development and Building construction
  - 3.1.4 Responsibilities of a building sub engineer
  - 3.1.5 Relation between owner, contractor and consultants
- 3.2 Accounts
  - 3.2.1 Familiarity with related Nepalese accounting system
  - 3.2.2 Administrative approval and technical sanction
- 3.3 Planning and Control
  - 3.3.1 List of activities
  - 3.3.2 Construction schedule
  - 3.3.3 Equipment and materials schedule
  - 3.3.4 Construction stages and operations
  - 3.3.5 Bar Chart
- 3.4 Municipal Building By-laws
  - 3.4.1 Sheet sizes
  - 3.4.2 Scales
  - 3.4.3 Setback
  - 3.4.4 Height controls
  - 3.4.5 Other requirements specifies by the municipalities
  - 3.4.6 FAR

### 4. Building Service

- 4.1 Water Supply
  - 4.1.1 General principle of water supply
  - 4.1.2 Water requirement standard for different buildings
  - 4.1.3 Storage and distribution of water
  - 4.1.4 Heating of water, storage and distribution requirements
- 4.2 Disposal system
  - 4.2.1 Septic tank, soak pit, vent and manhole
  - 4.2.2 Pipes for different sewage
  - 4.2.3 Incinerators
- 4.3 Electricity
  - 4.3.1 General principles of electrical installation and distribution
  - 4.3.2 Wiring systems in private and public building
  - 4.3.3 Ducts for electrical distribution
  - 4.3.4 Safety precautions

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- 4.4 Lighting
  - 4.4.1 General principles of lighting
  - 4.4.2 Illumination requirements and standards
  - 4.4.3 Combination of artificial and natural light
  - 4.4.4 Lighting fixtures

## **Part II Building**

### **5. Surveying**

- 5.1 General
  - 5.1.1 Primary divisions of survey
  - 5.1.2 Classification based on instruments and on methods
  - 5.1.3 Basic principle of surveying
  - 5.1.4 Scales, plans and maps
  - 5.1.4 System of field booking of surveying and levelling data
  - 5.1.5 Theodolite survey
- 5.2 Levelling
  - 5.2.1 Classification of levelling work
  - 5.2.2 Methods of levelling
  - 5.2.3 Levelling instruments and accessories
  - 5.2.4 Principles of levelling
  - 5.2.5 Temporary and permanent adjustments of a level
  - 5.2.6 Profile levelling
  - 5.2.7 Booking and reducing levels
- 5.3 Errors and their effects
  - 5.3.1 Kinds of errors
  - 5.3.2 Source of errors in chaining, levelling, plane tabling and compass surveying
  - 5.3.3 Effects of errors
- 5.4 Plane Tabling
  - 5.4.1 Equipments used
  - 5.4.2 Working operations
  - 5.4.3 Methods of plane tabling
  - 5.4.4 Merits and demerits of plane tabling
- 5.5 Contouring
  - 5.5.1 Definitions of terms
  - 5.5.2 Use contour maps
- 5.6 Setting out
  - 5.6.1 Small buildings
  - 5.6.2 Simple curves
  - 5.6.3 Locating the boundaries of farm lands

### **6. Construction Materials**

- 6.1 Stone
  - 6.1.1 Rocks and their characteristics
  - 6.1.2 Formation and availability of stones in Nepal
  - 6.1.3 Quarrying: excavation, Wedging and blasting
  - 6.1.4 Methods of laying and construction with various stones

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- 6.2 Aggregates
  - 6.2.1 Fine aggregates
  - 6.2.2 Coarse aggregates
  - 6.2.3 Availability and practice in Nepal
- 6.3 Cement
  - 6.3.1 Different cements: ingredients, properties and manufacture
  - 6.3.2 Storage and transport
  - 6.3.3 Admixtures
- 6.4 Metals and Alloys
  - 6.4.1 Wrought iron: Properties, use
  - 6.4.2 Steel: composition, properties, appearance, strength, constructional forms and manufacture
  - 6.4.3 Corrosion and its prevention
  - 6.4.4 Brass: uses
- 6.5 Brick
  - 6.5.1 Type
  - 6.5.2 Manufacture
  - 6.5.3 Laying
  - 6.5.4 Availability and practice in Nepal
- 6.6 Lime
  - 6.6.1 Manufacture
  - 6.6.2 Types and properties
  - 6.6.3 Uses
- 6.7 Paints and Varnishes
  - 6.7.1 Type and selection
  - 6.7.2 Preparation techniques
  - 6.7.3 Uses
- 6.8 Floor Finishes
  - 6.8.1 Punning
  - 6.8.2 Tiles: mosaic, clay, concrete, vinyl
  - 6.8.3 Marble and flagstones
  - 6.8.4 Wooden boarding and parqueting
- 6.9 Wall Finishes
  - 6.9.1 Plasters: cement, lime, mud
  - 6.9.2 Punning: cement, lime
  - 6.9.3 Cladding: wood, stone, tiles
- 6.10 Roofing Materials
  - 6.10.1 Clay tiles, ceramic tiles and states
  - 6.10.2 CGI and UPVC
- 6.11 Miscellaneous Materials
  - 6.11.1 Glass
  - 6.11.2 Plastics
  - 6.11.3 Asphalt and Bitumen
  - 6.11.4 Surkhi
- 7. Structural Design**
  - 7.1 Timber Structures
    - 7.1.1 Allowable stresses
    - 7.1.2 Design of compression members
    - 7.1.3 Design of solid rectangular beams, design of simple steel beams

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- 7.1.4 Types of joints and their connections
- 7.2 Steel Structures
  - 7.2.1 Rivetted and welded connections: types, uses, detailing
  - 7.2.2 Detailing of simple roof trusses
  - 7.2.3 Detailing of rolled steel beams
  - 7.2.4 Detailing of column bases
- 7.3 R.C. Sections in Bending
  - 7.3.1 Basis assumptions
  - 7.3.2 Position of neutral axis
  - 7.3.3 Moment of resistance
  - 7.3.4 Under reinforced, over reinforced and balanced sections
  - 7.3.5 Analysis of singly and doubly reinforced rectangular sections
  - 7.3.6 Analysis of singly reinforced flanged sections
- 7.4 Shear and Bond for Reinforced Concrete (RC) Sections
  - 7.4.1 Behaviour of R.C. section in shear
  - 7.4.2 Shear resistance of R.C. section
  - 7.4.3 Types of shear reinforcement and their design
  - 7.4.4 Local and anchorage bond
  - 7.4.5 Determination of anchorage length
  - 7.4.6 Bar curtailment
- 7.5 Axially Loaded R.C
  - 7.5.1 Short and long columns
  - 7.5.2 Design of a rectangular column section
  - 7.5.3 Reinforcement detailing
- 7.6 Design and Detailing of R.C Structures
  - 7.6.1 IS code requirements
  - 7.6.2 Methods of design
  - 7.6.3 Singly reinforced T and L beams
  - 7.6.5 Simple one-way and two-way slabs
  - 7.6.6 Simple pad footings for columns
  - 7.6.8 Preparation of bar bending for RC design
- 7.7 Earthquake Resistant Design of Non-engineered Structures
  - 7.6.1 History of Earthquake in Nepal and damages
  - 7.6.2 Weakness of existing building
  - 7.6.3 Site consideration
  - 7.6.4 Building form, shape and size
  - 7.6.5 Size and location of openings
  - 7.6.6 Selection of materials
  - 7.6.7 Construction technology
  - 7.6.8 Seismic resistant components : through stone, vertical and horizontal reinforcement, diaphragm, boxing of building, lateral restrainers, unsupported length of wall, corner and junction of wall/connection of building components
- 8. Building Construction Technology**
  - 8.1 Foundations
    - 8.1.1 Function and necessity
    - 8.1.2 Subsoil exploration: test pit
    - 8.1.3 Safe bearing capacity of soils and its improvement

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- 8.1.4 Type and suitability of different foundations: shallow, deep (pile and well)
- 8.1.5 Methods of excavating
- 8.1.6 Shoring and dewatering
- 8.1.7 Elements of simple spread foundation
- 8.1.8 Stone masonry foundations
- 8.1.9 Raft foundation
- 8.2 Walls
  - 8.2.1 Types of walls: solid wall, partition wall, cavity wall, curtain wall
  - 8.2.2 Features and their functions
  - 8.2.3 Types of stone masonry: rubble, hammer dressed and ashlar masonry
  - 8.2.4 Brick Masonry: English, Flemish, garden rat trap, monk
  - 8.2.5 Types of concrete blocks
  - 8.2.6 Choosing wall thickness, height to length relation
  - 8.2.7 Use of scaffolding
  - 8.2.8 Procedure of constructing various masonry walls
- 8.3 Damp Proofing
  - 8.3.1 Source of dampness
  - 8.3.2 Remedial measures to prevent dampness
  - 8.3.3 Vertical and horizontal damp proofing
  - 8.3.4 Damp proofing materials
- 8.4 Concrete Technology
  - 8.4.1 Constituents, mixing and use of lime concrete
  - 8.4.2 Constituents, of cement concrete
  - 8.4.3 Grading of aggregates
  - 8.4.4 Concrete mixes
  - 8.4.5 Water cement ratio
  - 8.4.6 Workability
  - 8.4.7 Concrete laying
  - 8.4.8 Factors affecting strength of concrete
  - 8.4.9 Form work
  - 8.4.10 Vibrators
  - 8.4.11 Curing
  - 8.4.12 General introduction to Precast RC units
  - 8.4.13 Hydration and segregation
- 8.5 Wood Work
  - 8.5.1 Frame and shutters of doors and windows
  - 8.5.2 Timber construction of upper floors
  - 8.5.3 Design and construction of stairs
  - 8.5.4 Double timber roofs
  - 8.5.5 False ceiling
  - 8.5.6 Sky-light: elements, functions and construction details
- 8.6 Steel Work
  - 8.6.1 Steel work in windows: Standards, elements and functions
  - 8.6.2 Tubular and angle steel roofs
  - 8.6.3 Iron grill and lattice work

### **Part III Architecture -Maintenance of building**

#### **9. Building Design**

- 9.1 Analysis of Building Elements
  - 9.1.1 Bed
  - 9.1.2 Kitchen/Dining
  - 9.1.3 Living Hall
  - 9.1.4 Class Room
  - 9.1.5 Working Office Space
  - 9.1.6 Library
- 9.2 Design Consideration
  - 9.2.1 Specific program: space requirements
  - 9.2.2 Site: topography, orientation, environment
  - 9.2.3 Functional relationship between activities
  - 9.2.4 Culture: tradition, values, taste
  - 9.2.5 Economics: efficient use of space and materials
  - 9.2.6 Availability to technology and material
  - 9.2.7 Structure type and efficiency
  - 9.2.8 Optimum use of natural light and ventilation
  - 9.2.9 Aesthetics
- 9.3 Climatology
  - 9.3.1 Climate: sun, wind, rain, humidity
  - 9.3.2 Orientation of the building with respect to the sun and wind: best, optimum, bad
  - 9.3.3 Determination of length of roof projection to act as sunshade

#### **10. Architectural Modelling**

- 10.1 Modelling Materials and Practices
  - 10.1.1 Use of models
  - 10.1.2 Choice of materials
  - 10.1.3 Modelling techniques
  - 10.1.4 Accuracy of models
  - 10.1.5 Determination of degree of detailing
  - 10.1.6 Model construction of multi-storey buildings
  - 10.1.7 Contour models of sites
- 10.2 Equipments Required
  - 10.2.1 Choice of cutting tools
  - 10.2.2 Choice of adhesives
  - 10.2.3 Choice of colour and tone
  - 10.2.4 Choice of paint and brushes
  - 10.2.5 Miscellaneous tools

#### **11. Graphics and presentation**

- 11.1 Principles of Composition
  - 11.1.1 Balance
  - 11.1.2 Scale
  - 11.1.3 Rhythm
  - 11.1.4 Monotony
  - 11.1.5 Contrast
  - 11.1.6 Unity
  - 11.1.7 Focal point



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- 11.2 Tone
  - 11.2.1 Light
  - 11.2.2 Medium
  - 11.2.3 Dark
  - 11.2.4 Flat
  - 11.2.5 Graded
- 11.3 Free Hand Works
  - 11.3.1 Drawing lines
  - 11.3.2 Drawing letters
  - 11.3.3 Three dimensional objects
- 11.4 Presentation
  - 11.4.1 Textures
  - 11.4.2 Exterior and interior objects
  - 11.4.3 Human figures
  - 11.4.4 Shadows
- 11.5 Medium for Presentation
  - 11.5.1 Pencil techniques
  - 11.5.2 Colour history and type: pencil colour, water colour, Poster colour
  - 11.5.3 Primary, secondary and tertiary colours
  - 11.5.4 Warm and cool colours
  - 11.5.5 Properties of colour
  - 11.5.6 Colour circle
  - 11.5.7 Colour scheme: monochromatic, analogous, complementary and triad
- 11.6 Data Presentation in Graphical Forms
  - 11.6.1 Translation of numerical data into diagrams and vice versa
  - 11.6.2 Pie chart, bar chart and XY graphs
- 11.7 Cartography
  - 11.7.1 Tracing of land-use maps
  - 11.7.2 Presentation of land-use maps

## Sample Questions

1. Surveying is a process of
  - (a) Finding out area of land
  - (b) Representing the shape and size of the land into maps
  - (c) Locating or transferring design details on to the ground
  - (d) All above
  
2. An area can be completely defined with the use of linear measurements only, if :
  - (a) Its perimeter is known
  - (b) Its length and breadth is known
  - (c) It is enclosed by a triangle
  - (d) It is enclosed by a traverse whose perimeter can be measured
  
3. The trusted way of ensuring reliable survey works is:
  - (a) To be sincere and honest
  - (b) To follow the surveying procedure sincerely
  - (c) To take check measurements
  - (d) To get the works checked by seniors
  
4. Contours are useful for:
  - (a) The calculation of area
  - (b) The calculation of slopes
  - (c) The calculation of volumes of cut and fill
  - (d) the interpretation of land use
  
5. Errors are the result of
  - (a) A combination of unavoidable imperfections
  - (b) Instrumental problems only
  - (c) Careless works only
  - (d) Surveying procedure only