

प्रदेश लोक सेवा आयोग, बागमती प्रदेश
इन्जिनियरिंग सेवा, सिभिल समूह, बिल्डिङ एण्ड आर्किटेक्ट उपसमूह, पाँचौं तह,
सब इन्जिनियर पदको खुला प्रतियोगितात्मक 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. लिखित परीक्षामा यथासम्भव निम्नानुसार प्रश्नहरू सोधिनेछ ।

Part	I Civil Engineering				II Building				III Architecture			विविध
	1	2	3	4	5	6	7	8	9	10	11	
एकाई	1	2	3	4	5	6	7	8	9	10	11	12
प्रश्न सङ्ख्या	5	6	4	6	3	2	5	3	6	2	4	4

३. वस्तुगत बहुवैकल्पिक (Multiple Choice) प्रश्नहरूको गलत उत्तर दिएमा प्रत्येक गलत उत्तर बापत २०प्रतिशत अङ्क कट्टा गरिनेछ । तर उत्तर नदिएमा त्यस बापत अङ्क दिइने छैन र अङ्क कट्टा पनि गरिने छैन ।
४. यस पाठ्यक्रम योजना अन्तर्गतका पत्र/विषयका विषयवस्तुमा जेसुकै लेखिएको भए तापनि पाठ्यक्रममा परेका कानून, ऐन, नियम तथा नीतिहरू परीक्षाको मिति भन्दा ३महिना अगाडि (संशोधन भएका वा संशोधन भई हटाईएका वा थप गरी संशोधन भई (कायम रहेकालाई यस पाठ्यक्रममा परेको सम्झनु पर्दछ) ।
५. प्रथम चरणको लिखित परीक्षाबाट छनौट भएका उम्मेदवारहरूलाई मात्र द्वितीय चरणको अन्तर्वार्तामा सम्मिलित गराइनेछ ।
६. पाठ्यक्रम लागू मिति:- २०७७।०९।१२

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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

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4.3.4 Safety precautions

- 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
 - 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

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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

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12. विविध

12.1 अङ्ग्रेजी: Knowledge on writing correct English sentence, letter, and report according to English grammar based on the following syntactic functions:

A. Parts of Speech:

- i. Noun
- ii. Pronoun
- iii. Adjective
- iv. Determiner
- v. Verb
- vi. Adverb
- vii. Preposition
- viii. Conjunction and
- ix. Interjection

B. Infinitive and gerund, reported speech and tense

12.1 नेपाली: नेपाली भाषामा स्तरीय लेखनको लागि आवश्यक पर्ने व्याकरण अनुरूप शुद्धा शुद्धि बनाउने। यसका लागि निम्न विषयमा ध्यान केन्द्रित गर्ने:
वर्णविन्यास, पदसङ्गति, नाम, सर्वनाम, क्रियापद, विशेषण, काल, वाच्य, पदवर्ग, अनुकरणात्मक शब्द, कारक र विभक्ति, वचन, पुरुष, लिङ्ग, उल्टो अर्थ आउने शब्द, पर्यायवाची शब्द, तत्सम शब्द, तद्भव शब्द, आगन्तुक शब्द, उपसर्ग लागेर निर्मित शब्दहरू, प्रत्यय लागेर निर्मित शब्दहरू, समास भएर निर्मित शब्दहरू, द्वित्व भएर निर्मित शब्दहरू, ह्रस्व दीर्घ, श, ष, स लगायतका व्याकरणगत शुद्ध लेखनशैलीमा केन्द्रित विषयहरू सहितको नेपाली शुद्धाशुद्धिको ज्ञान।