

काठमाण्डौ उपत्यका खानेपानी लिमिटेड
प्राविधिक सेवा, आर्किटेक्ट समूह, तह ५, आर्किटेक्ट ओभरसियर पदको खुला र आन्तरिक प्रतियोगितात्मक
परीक्षाको पाठ्यक्रम

पाठ्यक्रम योजनालाई निम्नानुसारका दुई चरणमा विभाजन गरिएको छ :

प्रथम चरण :- लिखित परीक्षा

पूर्णाङ्क :- २००

द्वितीय चरण :- अन्तर्वार्ता

पूर्णाङ्क :- ३०

परीक्षा योजना (Examination Scheme)

१. प्रथमचरण: - लिखित परीक्षा

पूर्णाङ्क :- २००

पत्र	विषय	पूर्णाङ्क	उतीर्णाङ्क	परीक्षा प्रणाली	प्रश्नसंख्याXअङ्क	समय
प्रथम	सेवा (प्राविधिक	१००	४०	वस्तुगत - बहुवैकल्पिक प्रश्न(MCQ)	५० प्रश्नX २ अङ्क	४५ मिनेट
द्वितीय	विषय) सम्बन्धी तथा सामान्य र संस्थागत ज्ञान	१००	४०	विषयगत- छोटो उत्तर आउने प्रश्न	८ प्रश्नX ५अङ्क	२ घण्टा ३० मिनेट
				विषयगत- लामो उत्तर आउने प्रश्न	६ प्रश्न X १०अङ्क	

२. द्वितीय चरण : -अन्तर्वार्ता

पूर्णाङ्क :- ३०

विषय	पूर्णाङ्क	परीक्षा प्रणाली
अन्तर्वार्ता	३०	मौखिक

द्रष्टव्य :

- यो पाठ्यक्रमको योजनालाई प्रथम चरण र द्वितीय चरण गरी दुई भागमा विभाजन गरिएको छ ।
- लिखित परीक्षाको माध्यम भाषा नेपाली वा अंग्रेजी अथवा नेपाली र अंग्रेजी दुवै हुनेछ ।
- प्रथम र द्वितीय पत्रको पत्रको विषयवस्तु एउटै हुनेछ ।
- प्रथम 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 ।
- वस्तुगत बहुवैकल्पिक हुने परीक्षामा परीक्षार्थीले उत्तर लेख्दा अंग्रेजी ठूलो अक्षर (Capital letter) A,B,C,D मा लेख्नुपर्नेछ । सानो अक्षर (Small letter) a,b,c,d लेखेको वा अन्य कुनै सङ्केत गरेको भए सबै उत्तरपुस्तिका रद्द हुनेछ ।
- बहुवैकल्पिक प्रश्नहरू हुने परीक्षामा कुनै प्रकारको क्याल्कुलेटर (Calculator)प्रयोग गर्न पाइने छैन ।
- परीक्षामा सोधिने प्रश्नसंख्या, अङ्क र अङ्कभार यथासम्भव सम्बन्धित पत्र /विषयमा दिइए अनुसार हुनेछ ।
- विषयगत प्रश्न हुने पत्रका हकमा प्रत्येक खण्डका लागि छुट्टाछुट्टै उत्तरपुस्तिकाहरू हुनेछन् । परीक्षार्थीले प्रत्येक खण्डका प्रश्नहरूको उत्तर सोही खण्डको उत्तरपुस्तिकामा लेख्नुपर्ने छ ।
- यस पाठ्यक्रम योजना अन्तर्गतका पत्र/विषयका विषयवस्तुमा जेसुकै लेखिएको भए तापनि पाठ्यक्रममा परेका कानून, ऐन, नियम, विनियम तथा नीतिहरू परीक्षाको मिति भन्दा ३ महिना अगाडि (संशोधन भएका वा संशोधन भई हटाईएका वा थप गरी संशोधन भई) कायम रहेकालाई यस पाठ्यक्रममा परेको सम्झनु पर्दछ ।
- प्रथम चरणको परीक्षाबाट छनौट भएका उम्मेदवारलाई मात्र द्वितीय चरणको परीक्षामा सम्मिलित गराइनेछ ।
- पाठ्यक्रम लागू मिति :- २०८१/४/१९

प्रथम र द्वितीय पत्र :- सेवा (प्राविधिक विषय) सम्बन्धी तथा सामान्य र संस्थागत ज्ञान

सेवा सम्बन्धी : खण्ड (क)

1. Civil Engineering Drawing

1.1 General

- 1.1.1 Importance, aims and objectives of drawing
- 1.1.2 Drawing equipments
- 1.1.3 Standard drawing sheets sizes
- 1.1.4 Drafting techniques and methods in common practice
- 1.1.5 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, Approximate quantity estimate, Detailed estimate and 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, Types and Necessity
- 2.3.2 Interpretation of Specifications

2.4 Estimating

- 2.4.1 Earthwork
- 2.4.2 Estimate of buildings

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- 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 and Methods of valuation
 - 2.5.2 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, Equipment and materials schedule
 - 3.3.3 Construction stages and operations
 - 3.3.4 Bar Chart
 - 3.4 Building By-laws
 - 3.4.1 Sheet sizes, Scales, Setback, Height controls, FAR
- 4. **Surveying**
 - 4.1 General
 - 4.1.1 Primary divisions of survey
 - 4.1.2 Classification based on instruments and on methods
 - 4.1.3 Basic principle of surveying
 - 4.1.4 Scales, plans and maps
 - 4.1.5 System of field booking of surveying and levelling data
 - 4.1.6 Theodolite survey
 - 4.2 Levelling
 - 4.2.1 Classification of levelling work
 - 4.2.2 Methods of levelling
 - 4.2.3 Levelling instruments and accessories
 - 4.2.4 Principles of levelling
 - 4.2.5 Temporary and permanent adjustments of a level
 - 4.2.6 Profile levelling
 - 4.2.7 Booking and reducing levels
 - 4.3 Errors and their effects
 - 4.3.1 Kinds of errors
 - 4.3.2 Source of errors in chaining, levelling, plane tabling and compass surveying
 - 4.3.3 Effects of errors
 - 4.4 Plane Tabling
 - 4.4.1 Equipments used
 - 4.4.2 Working operations
 - 4.4.3 Methods of plane tabling

4.4.4 Merits and demerits of plane tabling

4.5 Contouring

4.5.1 Definitions of terms

4.5.2 Use contour maps

4.6 Setting out

4.6.1 Small buildings

4.6.2 Simple curves

4.6.3 Locating the boundaries of farm lands

5. **Building Service**

5.1 Water Supply

5.1.1 General principle of water supply

5.1.2 Water requirement standard for different buildings

5.1.3 Storage and distribution of water

5.1.4 Heating of water, storage and distribution requirements

5.2 Disposal system

5.2.1 Septic tank, soak pit, vent and manhole

5.2.2 Pipes for different sewage

5.2.3 Incinerators

5.3 Electricity

5.3.1 General principles of electrical installation and distribution

5.3.2 Wiring systems in private and public building

5.3.3 Ducts for electrical distribution

5.3.4 Safety precautions

5.4 Lighting

5.4.1 General principles of lighting

5.4.2 Illumination requirements and standards

5.4.3 Combination of artificial and natural light

5.4.4 Lighting fixtures

सेवा सम्बन्धी : खण्ड (ख)

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

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
 - 7.6.4 Simple one-way and two-way slabs
 - 7.6.5 Simple pad footings for columns
 - 7.6.6 Preparation of bar bending for RC design
- 7.7 Earthquake Resistant Design of Non-engineered Structures
 - 7.7.1 History of Earthquake in Nepal and damages
 - 7.7.2 Weakness of existing building
 - 7.7.3 Site consideration
 - 7.7.4 Building form, shape and size
 - 7.7.5 Size and location of openings
 - 7.7.6 Selection of materials
 - 7.7.7 Construction technology
 - 7.7.8 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
 - 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

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- 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
- 9. **Building Design**
 - 9.1 Analysis of Building Elements
 - 9.1.1 Bed and wardrobe
 - 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
 - 9.1.7 Overall Interior Design
 - 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

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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

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

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- 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

सामान्य र संस्थागत ज्ञान : खण्ड (ग)

12. **संविधान, ऐन र नियमहरू तथा संस्थागत ज्ञान**
- 12.1 नेपालको भूगोल - धरातलिय स्वरुप, जलवायु, हावापानी र जनजीवन
 - 12.2 नेपालका प्राकृतिक स्रोत र साधनहरू सम्बन्धी जानकारी
 - 12.3 नेपालको ईतिहास- नेपालको ईतिहासका महत्वपूर्ण घटनाहरू
 - 12.4 नेपाली समाजका परम्परा, सामाजिक मूल्य र मान्यता, धर्म, जातजाति र भाषा
 - 12.5 नेपालको राजनैतिक विभाजन, संघ प्रदेश र स्थानीय तह सम्बन्धी सामान्य जानकारी
 - 12.6 नेपालको संविधान (भाग १ र ३)
 - 12.7 विज्ञानका महत्वपूर्ण उपलब्धिहरू सम्बन्धी सामान्य जानकारी
 - 12.8 राष्ट्रिय तथा अन्तर्राष्ट्रिय महत्वपूर्ण समसामयिक घटनाहरू
 - 12.9 काठमाण्डौ उपत्यका खानेपानी लिमिटेडको स्थापना, लक्ष्य, उद्देश्य र प्रमुख कार्यहरू
 - 12.10 काठमाण्डौ उपत्यका खानेपानी लिमिटेडको कर्मचारी सेवा शर्त सम्बन्धी विनियमावली
 - 12.11 काठमाण्डौ उपत्यका खानेपानी लिमिटेडआर्थिक प्रशासन विनियमावली
 - 12.12 सार्वजनिक खरिद ऐन, २०६३ (परिच्छेद १ र २) तथा सार्वजनिक खरिद नियमावली, २०६४
 - 12.13 वातावरण संरक्षण ऐन, २०७६
 - 12.14 Public Private Partnership (PPP) को अवधारणा

प्रथम पत्रको लागि निम्नानुसार प्रश्नहरू सोधिने छ ।

प्रथम पत्र (वस्तुगत)				
विषय	खण्ड	परीक्षा प्रणाली	अङ्कभार	प्रश्न संख्या
सेवा सम्बन्धी	(क)	बहुवैकल्पिक प्रश्न (MCQs)	४०	२० प्रश्न × २ अङ्क = ४०
	(ख)		४०	२० प्रश्न × २ अङ्क = ४०
सामान्य र संस्थागत ज्ञान	(ग)		२०	१० प्रश्न × २ अङ्क = २०

द्वितीयपत्रको लागि निम्नानुसार प्रश्नहरू सोधिनेछ ।

द्वितीय पत्र (विषयगत)				
विषय	खण्ड	अङ्कभार	छोटो उत्तर	लामो उत्तर
सेवा सम्बन्धी	(क)	४०	४ प्रश्न × ५ अङ्क = २०	२ प्रश्न × १० अङ्क = २०
	(ख)	४०	४ प्रश्न × ५ अङ्क = २०	२ प्रश्न × १० अङ्क = २०
सामान्य र संस्थागत ज्ञान	(ग)	२०	४ प्रश्न × ५ अङ्क = २०	-