

**पदपूर्ती समिति**  
**चापाकोट नगरपालिकाको कार्यालय**  
**स्याङ्जा**

सब ईन्जिनियर, सहायक स्तर पाँचौ तहको खुल्ला प्रतियोगितात्मक लिखित परीक्षाको

**पाठ्यक्रमको रूपरेखा**

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				

**1. Surveying**

1.1 General

1.1.1 Classifications

1.1.2 Principle of surveying

1.1.3 Selection of suitable method

1.1.4 Scales, plans and maps

1.1.5 Entry into survey field books and level books

1.2 Levelling

1.2.1 Methods of levelling

1.2.2 Levelling instruments and accessories

1.2.3 Principles of levelling

1.3 Plane Tabling

1.3.1 Equipments required

1.3.2 Methods of plane tabling

1.3.3 Two and three point problems

1.4 Theodolite and Traverse surveying

1.4.1 Basic difference between different theodolites

1.4.2 Temporary adjustments of theodolites

1.4.3 Fundamental lines and desired relations

1.4.4 Tacheometry: stadia method

1.4.5 Trigonometrical levelling

1.4.6 Checks in closed traverse

1.5 Contouring

1.5.1 Characteristics of contour lines

1.5.2 Method of locating contours

1.5.3 Contour plotting

1.6 Setting Out

1.6.1 Small buildings

1.6.2 Simple curves

## **2. Construction Materials**

### 2.1 Stone

#### 2.1.1 Formation and availability of stones in Nepal

#### 2.1.2 Methods of laying and construction with various stones

### 2.2 Cement

#### 2.2.1 Different cements: Ingredients, properties and manufacture

#### 2.2.2 Storage and transport

#### 2.2.3 Admixtures 3

### 2.3 Clay and Clay Products

#### 2.3.1 Brick: type, manufacture, laying, bonds

### 2.4 Paints and Varnishes

#### 2.4.1 Type and selection

#### 2.4.2 Preparation techniques

#### 2.4.3 Use

### 2.5 Bitumen

#### 2.5.1 Type

#### 2.5.2 Selection

#### 2.5.3 Use

## **3. Mechanics of Materials and Structures**

### 3.1 Mechanics of Materials

#### 3.1.1 Internal effects of loading

#### 3.1.2 Ultimate strength and working stress of materials

### 3.2 Mechanics of Beams

#### 3.2.1 Relation between shear force and bending moment

#### 3.2.2 Thrust, shear and bending moment diagrams for statically determinate beams under various types of loading

### 3.3 Simple Strut Theory

## **4. Hydraulics**

### 4.1 General

#### 4.1.1 Properties of fluid: mass, weight, specific weight, density, specific volume, specific gravity, viscosity

#### 4.1.2 Pressure and Pascal's law

### 4.2 Hydro-Kinematics and Hydro-Dynamics

#### 4.2.1 Energy of flowing liquid: elevation energy, Kinetic energy, potential energy, internal energy

### 4.3 Measurement of Discharge

#### 4.3.1 Weirs and notches

#### 4.3.2 Discharge formulas

### 4.4 Flows

#### 4.4.1 Characteristics of pipe flow and open channel flow

## **5. Soil Mechanics**

### 5.1 General

#### 5.1.1 Soil types and classification

#### 5.1.2 Three phase system of soil

#### 5.1.3 Unit Weight of soil mass: bulk density, saturated density, submerged density and dry density

#### 5.1.4 Interrelationship between specific gravity, void ratio, porosity, degree of saturation, percentage of air voids air content and density index

## 5.2 Soil Water Relation

### 5.2.1 Terzaghi's principle of effective stress

### 5.2.2 Darcy's law

### 5.2.3 Factors affecting permeability

## 5.3 Compaction of soil

### 5.3.1 Factors affecting soil compaction

### 5.3.2 Optimum moisture content

### 5.3.3 Relation between dry density and moisture content

## 5.4 Shear Strength of Soils

### 5.4.1 Mohr-Coulomb failure theory

### 5.4.2 Cohesion and angle of internal friction

## 5.5 Earth Pressures

### 5.5.1 Active and passive earth pressures

### 5.5.2 Lateral earth pressure theory

### 5.5.3 Rankine's earth pressure theory

## 5.6 Foundation Engineering

### 5.6.1 Terzaghi's general bearing capacity formulas and their application

## **6. Structural Design**

### 6.1 R.C. Sections in Bending

#### 6.1.1 Under reinforced, over reinforced and balanced sections

#### 6.1.2 Analysis of single and double reinforced rectangular sections

### 6.2 Shear and Bond for R.C. Sections

#### 6.2.1 Shear resistance of a R.C. section

#### 6.2.2 Types of Shear reinforcement and their design

#### 6.2.3 Determination of anchorage length

### 6.3 Axially Loaded R.C. Columns

#### 6.3.1 Short and long columns

#### 6.3.2 Design of a rectangular column section

### 6.4 Design and Drafting of R.C. Structures

#### 6.4.1 Singly and doubly reinforced rectangular beams

#### 6.4.2 Simple one-way and two-way slabs

#### 6.4.3 Axially loaded short and long columns

## **7. Building Construction Technology**

### 7.1 Foundations

#### 7.1.1 Subsoil exploration

#### 7.1.2 Type and suitability of different foundations: Shallow, deep

#### 7.1.3 Shoring and dewatering

#### 7.1.4 Design of simple brick or stone masonry foundations

### 7.2 Walls

#### 7.2.1 Type of walls and their functions

#### 7.2.2 Choosing wall thickness, Height to length relation

#### 7.2.3 Use of scaffolding

### 7.3 Damp Proofing

#### 7.3.1 Source of Dampness

#### 7.3.2 Remedial measures to prevent dampness

- 7.4 Concrete Technology
  - 7.4.1 Constituents of cement concrete
  - 7.4.2 Grading of aggregates
  - 7.4.3 Concrete mixes
  - 7.4.4 Water cement ratio
  - 7.4.5 Factors affecting strength of concrete
  - 7.4.6 Form work
  - 7.4.7 Curing
- 7.5 Wood work
  - 7.5.1 Frame and shutters of door and window
  - 7.5.2 Timber construction of upper floors
  - 7.5.3 Design and construction of stairs
- 7.6 Flooring and Finishing
  - 7.6.1 Floor finishes : brick, concrete, flagstone
  - 7.6.2 Plastering

## **8. Water Supply and Sanitation Engineering**

- 8.1 General
  - 8.1.1 Objectives of water supply system
  - 8.1.2 Source of water and its selection: gravity and artisan springs, shallow and deep wells; infiltration galleries.
- 8.2 Gravity Water Supply System
  - 8.2.1 Design period
  - 8.2.2 Determination of daily water demand
  - 8.2.3 Determination of storage tank capacity
  - 8.2.4 Selection of pipe
  - 8.2.5 Pipe line design and hydraulic grade line
- 8.3 Design of Sewer
  - 8.3.1 Quantity of sanitary sewage
  - 8.3.2 Maximum, Minimum and self cleaning velocity
- 8.4 Excreta Disposal and Unsewered Area
  - 8.4.1 Pit latrine
  - 8.4.2 Design of septic tank

## **9. Irrigation Engineering**

- 9.1 General
  - 9.1.1 Advantages and Disadvantages of irrigation
- 9.2 Water Requirement
  - 9.2.1 Crop season and principal crops
  - 9.2.2 Base period
- 9.3 Flow irrigation Canals
  - 9.3.1 Canal losses and their minimization
  - 9.3.2 Maximum and minimum velocities
  - 9.3.3 Design of irrigation canal section based on manning's formula
  - 9.3.4 Need and location of spillways
  - 9.3.5 Head works for small canals

## **10. Highway Engineering**

### 10.1 General

10.1.1 Introduction to transportation systems

10.1.2 Historic development of roads

10.1.3 Classification of road in Nepal

10.1.4 Basic requirements of road alignment

### 10.2 Geometric Design

10.2.1 Basic design control and criteria for design

10.2.2 Elements of cross section, typical cross-section for all roads in filling and cutting

10.2.3 Camber

10.2.4 Determination of radius of horizontal curves

10.2.5 Superlevation

10.2.6 Sight distances

10.2.7 Gradient

10.2.8 Use of Nepal Road Standard,2027(First Revision 2045) and subsequent revision in road design

### 10.3 Drainage System

10.3.1 Importance of drainage system and requirements of a good drainage system

### 10.4 Road Pavement

10.4.1 Pavement structure and its components: subgrade, sub-base, base and surface

### 10.5 Road Machineries

10.5.1 Earth moving and compacting machines

### 10.6 Road Construction Technology

### 10.7 Bridge

10.7.1 T-beam bridge

10.7.2 Timber bridges

### 10.8 Road Maintenance and Repair

10.8.1 Type of maintenance Works

### 10.9 Tracks and Trails

## **11. Estimating and Costing**

### 11.1 General

11.1.1 Main items of work

11.1.2 Units of measurement and payment of various items of work and material

11.1.3 Standard estimate formats of government offices

### 11.2 Rate Analysis

11.2.1 Basic general knowledge on the use of rate analysis norms prepared by Ministry of Works and Transport and the district rates prescribed by district development committee

### 11.3 Specifications

11.3.1 Interpretation of specifications

### 11.4 Valuation

11.4.1 Methods of valuation

11.4.2 Basic general knowledge of standard formats used by commercial banks and NIDC for valuation

## **12. Construction Management**

### 12.1 Organization

12.1.1 Need for organization

12.1.2 Responsibilities of a civil overseer

- 12.1.3 Relation between Owner, Contractor and Engineer
- 12.2 Site Management
  - 12.2.1 Preparation of site plan
  - 12.2.2 Organizing labor
  - 12.2.3 Measures to improve labor efficiency
  - 12.2.4 Accident prevention
- 12.3 Contract Procedure
  - 12.3.1 Contracts
  - 12.3.2 Departmental works and day-work
    - 12.3.3 Types of contracts
  - 12.3.4 Tender and tender notice
  - 12.3.5 Earnest money and security deposit
  - 12.3.6 Preparation before inviting tender
  - 12.3.7 Agreement
  - 12.3.8 Conditions of contract
  - 12.3.9 Construction supervision
- 12.4 Accounts
  - 12.4.1 Administrative approval and technical sanction
  - 12.4.2 Familiarity with standard account keeping formats used in governmental organizations
  - 12.4.3 Muster roll
  - 12.4.4 Completion report
- 12.5 Planning and Control
  - 12.5.1 Construction schedule
  - 12.5.2 Equipment and materials schedule
  - 12.5.3 Construction stages and operations
  - 12.5.4 Bar chart

### 13. Airport Engineering

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|---------------------------------------------------------------|---------------------------------------------------------------|
| 13.1 General                                                  | 13.2.3 Planning of Airport and its elements                   |
| 13.1.1 Introduction to Air Transport System                   | 13.2.4 Terminal Building and Control Tower                    |
| 13.1.2 Historic development of Airports in Nepal              | 13.2.5 Drainage System                                        |
| 13.1.3 Classification of Airports                             | 13.2.6 Geometric design, pavement structure and its component |
| 13.1.4 Airport terminologies                                  | 13.2.7 Basic knowledge of Heliport and Hangers                |
| 13.2 Design                                                   | 13.3 Airport Maintenance                                      |
| 13.2.1 Basic design control and criteria for design           | 13.3.1 Types of maintenance                                   |
| 13.2.2 General items contained in ANNEX 14 (ICAO Publication) | 13.3.2 Methods of maintenance                                 |

१४. स्थानीय स्वायत्त शासन ऐन, २०५५ को परिच्छेद ९

१५. स्थानीय स्वायत्त शासन नियमावली, २०५६ को परिच्छेद ६ र ७

१६. स्थानीय निकाय आर्थिक प्रशासन नियमावली, २०६४ को परिच्छेद ५ र परिच्छेद ६

१७. वस्ती विकास, शहरी योजना तथा भवन निर्माण मापदण्ड, २०७२