

प्रदेश तथा स्थानीय तह तर्फका नेपाल इन्जिनियरिङ्ग सेवा, सिभिल समूह अन्तर्गतका जनरल, हाइवे, स्यानिटरी, इरिगेशन, हाइड्रोपावर र हाइड्रोलोजी उपसमूह, सहायकस्तर पाँचौं तह सब-इन्जिनियर पदको खुला प्रतियोगितात्मक लिखित परीक्षाको पाठ्यक्रम एवं परीक्षा योजना

**पाठ्यक्रमको रूपरेखा:-** यस पाठ्यक्रमको आधारमा निम्नानुसारका चरणमा परीक्षा लिइने छ:-

क. प्रथम चरण: लिखित परीक्षा (Written Examination)

पूर्णाङ्क: १००

ख. द्वितीय चरण: अन्तर्वार्ता (Interview)

पूर्णाङ्क: १५

### परीक्षा योजना (Examination Scheme)

**प्रथम चरण :- लिखित परीक्षा (Written Examination)**

| विषय          | पूर्णाङ्क | उत्तिर्णाङ्क | परीक्षा प्रणाली                           | प्रश्न संख्या × अङ्कभार | समय      |
|---------------|-----------|--------------|---|-------------------------|----------|
| सेवा सम्बन्धी | १००       | ४०           | वस्तुगत बहुवैकल्पिक<br>(Multiple Choice ) | ५० प्रश्न × २ अङ्क=१००  | ४५ मिनेट |

**द्वितीय चरण:- अन्तर्वार्ता (Interview)**

| विषय         | पूर्णाङ्क | परीक्षा प्रणाली |
|--------------|-----------|-----------------|
| अन्तर्वार्ता | १५        | मौखिक           |

### द्रष्टव्य :

- लिखित परीक्षाको माध्यम भाषा नेपाली वा अंग्रेजी अथवा नेपाली र अंग्रेजी दुबै हुन सक्नेछ ।
- लिखित परीक्षामा यथासम्भव निम्नानुसार प्रश्नहरू सोधिनेछ ।

| पाठ्यक्रम<br>एकाइ | १ | २ | ३ | ४ | ५ | ६ | ७ | ८ | ९ | १० | ११ | १२ | १३ |
|-------------------|---|---|---|---|---|---|---|---|---|----|----|----|----|
| प्रश्न संख्या     | ४ | ४ | ३ | ४ | ४ | ४ | ४ | ४ | ४ | ४  | ४  | ५  | २  |

- वस्तुगत बहुवैकल्पिक (Multiple choice) प्रश्नहरूको गलत उत्तर दिएमा प्रत्येक गलत उत्तर वापत २० प्रतिशत अङ्क कट्टा गरिनेछ । तर उत्तर नदिएमा त्यस वापत अङ्क दिइने छैन र अङ्क कट्टा पनि गरिने छैन ।
- यस पाठ्यक्रम योजना अन्तर्गतका पत्र/विषयका विषयवस्तुमा जेसुकै लेखिएको भए तापनि पाठ्यक्रममा परेका ऐन, नियम तथा नीतिहरू परीक्षाको मिति भन्दा ३ महिना अगाडी (संशोधन भएका वा संशोधन भई हटाइएका वा थप गरी संशोधन भई) कायम रहेकालाई यस पाठ्यक्रममा परेको सम्झनु पर्दछ ।
- प्रथम चरणको लिखित परीक्षाबाट छनौट भएका उम्मेदवारहरूलाई मात्र द्वितीय चरणको अन्तर्वार्तामा सम्मिलित गराइने छ ।
- पाठ्यक्रम लागू हुने मिति:- २०७८/०८/०६

प्रदेश तथा स्थानीय तह तर्फका नेपाल इन्जिनियरिङ्ग सेवा, सिभिल समूह अन्तर्गतका जनरल, हाइवे, स्यानिटरी, इरिगेशन, हाइड्रोपावर र हाइड्रोलोजी उपसमूह, सहायकस्तर पाँचौ तह सब-इन्जिनियर पदको खुला प्रतियोगितात्मक लिखित परीक्षाको पाठ्यक्रम एवं परीक्षा योजना

पत्र/विषय:- सेवा सम्बन्धी

**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 leveling
- 1.2.2 Levelling instruments and accessories
- 1.2.3 Principles of leveling

1.3 Plane Tabling

- 1.3.1 Equipment 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 Tachometry: stadia method
- 1.4.5 Trigonometrical levelling
- 1.4.6 Checks in a 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 types of cement: Ingredients, properties, and manufacture
- 2.2.2 Storage and transport
- 2.2.3 Admixtures

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

प्रदेश तथा स्थानीय तह तर्फका नेपाल इन्जिनियरिङ्ग सेवा, सिभिल समूह अन्तर्गतका जनरल, हाइवे, स्यानिटरी, इरिगेशन, हाइड्रोपावर र हाइड्रोलोजी उपसमूह, सहायकस्तर पाँचौ तह सब-इन्जिनियर पदको खुला प्रतियोगितात्मक लिखित परीक्षाको पाठ्यक्रम एवं परीक्षा योजना

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

प्रदेश तथा स्थानीय तह तर्फका नेपाल इन्जिनियरिङ्ग सेवा, सिभिल समूह अन्तर्गतका जनरल, हाइवे, स्यानिटरी, इरिगेशन, हाइड्रोपावर र हाइड्रोलेजी उपसमूह, सहायकस्तर पाँचौ तह सब-इन्जिनियर पदको खुला प्रतियोगितात्मक लिखित परीक्षाको पाठ्यक्रम एवं परीक्षा योजना

### 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 the strength of concrete

7.4.6 Formwork

7.4.7 Curing

### 7.5 Woodwork

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

### 7.7 Earthquake resistant building technique

## 8. Water Supply and Sanitation Engineering

### 8.1 General

8.1.1 Objectives of the water supply system

8.1.2 Source of water and its selection: gravity and artisan springs, shallow and deep wells; infiltration galleries, Lift water supply

### 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 Pipeline design and hydraulic grade line

8.2.6 Plumbing works

### 8.3 Design of Sewer

8.3.1 Quantity of sanitary sewage

8.3.2 Maximum, Minimum and self-cleaning velocity

प्रदेश तथा स्थानीय तह तर्फका नेपाल इन्जिनियरिङ्ग सेवा, सिभिल समूह अन्तर्गतका जनरल, हाइवे, स्यानिटरी, इरिगेशन, हाइड्रोपावर र हाइड्रोलोजी उपसमूह, सहायकस्तर पाँचौ तह सब-इन्जिनियर पदको खुला प्रतियोगितात्मक लिखित परीक्षाको पाठ्यक्रम एवं परीक्षा योजना

#### 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 the 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, the 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 Superelevation

##### 10.2.6 Sight distances

##### 10.2.7 Gradient

##### 10.2.8 Nepal Road Standard, 2070

#### 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 courses

#### 10.5 Road Machineries

##### 10.5.1 Earthmoving and compacting machines

#### 10.6 Road Construction Technology

#### 10.7 Bridge

##### 10.7.1 T-beam bridge

##### 10.7.2 Timber bridges

##### 10.7.3 Trail suspension and suspended 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

##### 11.1.4 Types of estimates

##### 11.1.5 Data required for the preparation of an estimate

प्रदेश तथा स्थानीय तह तर्फका नेपाल इन्जिनियरिङ्ग सेवा, सिभिल समूह अन्तर्गतका जनरल, हाइवे, स्यानिटरी, इरिगेशन, हाइड्रोपावर र हाइड्रोलेजी उपसमूह, सहायकस्तर पाँचौ तह सब-इन्जिनियर पदको खुला प्रतियोगितात्मक लिखित परीक्षाको पाठ्यक्रम एवं परीक्षा योजना

- 11.2 Rate Analysis
- 11.3 Specifications
  - 11.3.1 purpose and types of specification
  - 11.3.2 Interpretation of specifications
- 11.4 Valuation
  - 11.4.1 Methods of valuation
  - 11.4.2 Basic knowledge on building valuation
- 12. **Construction Management**
  - 12.1 Organization
    - 12.1.1 Need for organization
    - 12.1.2 Responsibilities of a civil Sub-Engineer
    - 12.1.3 Relation between Owner, Contractor and Engineer
  - 12.2 Site Management
    - 12.2.1 Preparation of site plan
    - 12.2.2 Organizing labour
    - 12.2.3 Measures to improve labour efficiency
    - 12.2.4 Accident prevention
  - 12.3 Contract Procedure
    - 12.3.1 Procurements
    - 12.3.2 Procurement planning
    - 12.3.3 Contracts
    - 12.3.4 Departmental works and day-work
    - 12.3.5 Types of contracts
    - 12.3.6 Tender and tender notice
    - 12.3.7 Earnest money and security deposit
    - 12.3.8 Preparation before inviting tender
    - 12.3.9 Evaluation of bids and award
    - 12.3.10 Agreement
    - 12.3.11 Insurance in construction
    - 12.3.12 Conditions of contract
    - 12.3.13 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 Measurement book
    - 12.4.5 Work 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. **Miscellaneous**
  - 13.1 निजामती सेवा ऐन, २०४९ र नियमावली, २०५०
  - 13.2 स्थानीय सरकार संचालन ऐन, २०७४
  - 13.3 सुदूरपश्चिम प्रदेश सुशासन ऐन, २०७५