

प्रदेश लोक सेवा आयोग

गण्डकी प्रदेश

नेपाल इन्जिनियरिङ सेवा, सिभिल समूह अन्तर्गतका जनरल, हाइवे, स्यानिटरी र इरिगेसन उपसमूह, सब-इन्जिनियर (सहायकस्तर पाँचौ) पद (प्रदेश/स्थानीय तह) को खुला प्रतियोगात्मक परीक्षाको

पाठ्यक्रम

पाठ्यक्रमको रूपरेखा:- यस पाठ्यक्रमको आधारमा निम्नानुसार चरणमा परीक्षा लिइने छः

प्रथम चरण:- लिखित परीक्षा

पूर्णाङ्क:-१००

द्वितीय चरण:- अन्तर्वार्ता

पूर्णाङ्क:-२०

प्रथम चरण — लिखित परीक्षा योजना (Examination Scheme)

विषय	पूर्णाङ्क	उत्तीर्णाङ्क	परीक्षा प्रणाली	प्रश्न संख्या × अङ्कभार	समय
सेवा सम्बन्धी	१००	४०	वस्तुगत बहुवैकल्पिक (Multiple Choice)	५० प्रश्न × २ अङ्क = १००	४५ मिनेट

द्वितीय चरण:

विषय	पूर्णाङ्क	परीक्षा प्रणाली
अन्तर्वार्ता	२०	मौखिक

द्रष्टव्यः

- यो पाठ्यक्रम योजनालाई लिखित परीक्षा र अन्तर्वार्ता गरी दुई चरणमा विभाजन गरिएको छ।
- प्रश्नपत्र अंग्रेजी भाषामा हुनेछ।
- लिखित परीक्षाको माध्यम भाषा नेपाली वा अंग्रेजी अथवा नेपाली र अंग्रेजी दुवै 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।
- परीक्षामा कुनै प्रकारको क्याल्कुलेटर (Calculator) प्रयोग गर्न पाइने छैन।
- लिखित परीक्षामा यथासम्भव निम्नानुसार प्रश्नहरू सोधिनेछ।

पाठ्यक्रमका एकाइ	1	2	3	4	5	6	7	8	9	10	11	12
प्रश्न संख्या	4	4	4	4	4	4	5	4	5	4	4	4

- आयोगबाट सञ्चालन हुने परीक्षामा परीक्षार्थीले मोबाइल वा यस्तै प्रकारका विद्युतीय उपकरण परीक्षा हलमा लैजान पाइने छैन।
- यस पाठ्यक्रम योजना अन्तर्गतका पत्र/विषयका विषयवस्तुमा जेसुकै लेखिएको भए तापनि पाठ्यक्रममा परेका कानून, ऐन, नियम 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 लिखित परीक्षाबाट छनौट भएका उम्मेदवारहरूलाई मात्र द्वितीय चरणको अन्तर्वार्तामा सम्मिलित गराइनेछ।
- पाठ्यक्रम लागू मिति:

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
- 1.4.7 Total Station Surveying: Components, Functions, Advantages, Features, Applications and Types of Total Station.
- 1.4.8 Global Positioning System (GPS): Components, Functions, Advantages, Features, Applications and Types of GPS.

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, manufacture, Types, Grades and Test
- 2.2.2 Storage and transport
- 2.2.3 Admixtures

2.3 Clay and Clay Products

- 2.3.1 Brick: type, manufacture, laying, bonds

- 2.3.2 Tile Types and Placing
- 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
 - 2.5.4 Test
- 2.6 Fine and Coarse Aggregates
 - 2.6.1 Properties, Shape and Size
 - 2.6.2 Quality
 - 2.6.3 Test
- 2.7 Bricks
 - 2.7.1 Properties, Shape and Size
 - 2.7.2 Quality
 - 2.7.3 Test
- 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
 - 7.4.8 Test of Fresh Concrete
 - 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, Tile, Marble, Interlocking concrete brick
 - 7.6.2 Plastering
 - 7.7 Earthquake Resistant Building Technique
 - 7.8 Internal Plumbing System
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
 - 8.2.6 Site selection & function of various components of rural water supply project components as Intake, Washout, Air Valve Chamber, IC, BPT, RVT, Collection Chamber, Distribution Chamber, Tap Stand Post, Kholsa crossing etc.
 - 8.2.7 Different Methods of Water Treatment: Screening, Filtration, Disinfection etc.
 - 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 Crop Water Requirements & Irrigation Methods

9.2.1 Agro-climate factors affecting the crop water requirements

9.2.2 Various methods of irrigation, their advantages and disadvantages, efficiencies and selection

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

9.3.6 Site selection and function of various types of irrigation structures as Desander Chamber, Escape, Division Box, Aqueduct, Super Passage, Outlet, Road Crossing, Footbridge, Drop etc.

9.3.7 Various Types of canal linings and their merits & demerits

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 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 courses

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
- 10.10 Green Road Concepts
- 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
 - 11.3 Specifications and QAP
 - 11.3.1 Interpretation of specifications
 - 11.3.2 QAP (Quality Assurance Plan)
 - 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 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