लोक सेवा आयोग

नेपाल इञ्जिनियरिङ्ग सेवा, सिभिल समूह अन्तर्गतका जनरल, हाईवे, स्यानीटरी, इरिगेशन, हाइड्रोपावर, हाइड्रोलोजी र एयरपोर्ट उप-समुह, राजपत्र अनंकित प्रथम श्रेणीका पदको खुला प्रतियोगितात्मक परीक्षाको पाठ्यक्रम

पाठ्यक्रमको रुपरेखा:– यस पाठ्यक्रमको आधारमा निम्नानुसार चरणमा परीक्षा लिइने छ :

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 X अङ्कभार	समय
सेवा सम्बन्धी	१००	४०	वस्तुगत बहुवैकल्पिक (Multiple Choice)	५० प्रश्न X २ अङ्क = १००	४५ मिनेट

द्वितीय चरण

विषय	पूर्णाङ्क	परीक्षा प्रणाली
अन्तर्वार्ता	२०	मौखिक

द्रष्टव्य :

१. लिखित परीक्षाको माध्यम भाषा नेपाली वा अंग्रेजी अथवा नेपाली र अंग्रेजी दुवै हुन सक्नेछ ।

२. लिखित परीक्षामा यथासम्भव निम्नानुसार प्रश्नहरु सोधिनेछ ।

पाठ्यक्रमका एकाइ	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**
प्रश्न संख्या	4	4	4	4	4	4	4	4	4	4	4	4	2

३. वस्तुगत बहुवैकल्पिक (Multiple Choice) प्रश्नहरुको 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 ।

४. यस पाठ्यक्रम योजना अन्तर्गतका पत्र/विषयका विषयवस्तुमा जेसुकै लेखिएको भए तापनि पाठ्यक्रममा परेका कानून, ऐन, नियम तथा नीतिहरु परीक्षाको मिति भन्दा ३ महिना अगाडि (संशोधन भएका वा संशोधन भई हटाईएका वा थप गरी संशोधन भई) कायम रहेकालाई यस पाठ्क्रममा परेको सम्झनु पर्दछ ।

५. प्रथम चरणको लिखित परीक्षाबाट छनौट भएका उम्मेदवारहरुलाई मात्र द्वितीय चरणको अन्तर्वार्तामा सम्मिलित गराइनेछ ।

६. पाठ्यक्रम लागू मिति :- २०७४/१०/१७

पत्र/ विषय :– सेवा सम्वन्धी

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 palne 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
- 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
- 4.4.1Characteristics 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 pr-went 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 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 bride
- 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

13.1 General
- 13.1.1 Introduction to Air Transport System
- 13.1.2 Historic development of Airports in Nepal
- 13.1.3 Classification of Airports
- 13.1.4 Airport terminologies

13.2 Design
- 13.2.1 Basic design control and criteria for design
- 13.2.2 General items contained in ANNEX 14 (ICAO Publication)
- 13.2.3 Planning of Airport and its elements
- 13.2.4 Terminal Building and Control Tower
- 13.2.5 Drainage System
- 13.2.6 Geometric design, pavement structure and its component
- 13.2.7 Basic knowledge of Heliport and Hangers

13.3 Airport Maintenance
- 13.3.1 Types of maintenance
- 13.3.2 Methods of maintenance