

लोक सेवा आयोग

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

यस पाठ्यक्रमलाई दुई भागमा विभाजन गरिएको छ ।

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				

१. यथासम्भव पाठ्यक्रमका सवै एकाईवाट प्रश्नहरु सोधिनेछन् ।
२. लिखित परीक्षामा गल्ती गरेको प्रश्नोत्तरका लागि २० प्रतिशत अङ्क कट्टा गरिने छ ।
३. यस पाठ्यक्रममा जेसुकै लेखिएको भएता पनि पाठ्यक्रममा परेका ऐन, नियमहरु परीक्षाको मिति भन्दा ३ महिना अगाडि (संशोधन भएका वा संशोधन भई हटाइएका वा थप गरी संशोधन भई) कायम रहेकालाई यस पाठ्यक्रममा परेको सम्झनु पर्दछ ।
४. पाठ्यक्रम लागू हुने मिति २०५१।४।१९

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प्रतियोगितात्मक परीक्षाको पाठ्यक्रम

समय :- ४५ मिनेट

प्रश्न संख्या :- ५०

पूर्णाङ्क :- १००

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

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- 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

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- 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

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- 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

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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 courses

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- 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

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- 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
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Model Questions

1. According to Nepal Road Standards, for a design speed of 60 km/h the stopping sight distance is
a) 105 m b) 85 m c) 75 m d) 95 m
2. To prepare M15 concrete, the maximum amount of water which could be added per kilogramme of cement is:
a) 30 gm b) 640 gm c) 34 gm d) 550 gm
3. In open channel flow, the velocity of water is inversely proportional to
a) bed slope (b) discharge
c) Cross sectional area (d) length of the channel
4. The bearing of line AB is $152^{\circ}20'$ and the angle ABC is $124^{\circ}38'$ what is the bearing of BC ?
a) N $96^{\circ}58'E$ b) $83^{\circ}2'$
c) S $83^{\circ}2' E$ d) $6^{\circ}58'$
5. The observed reading on a levelling staff was 3695 mm. If the staff was 150 mm off the vertical through its bottom, What should be the correct reading ?
a) 3692 mm b) 3545 mm
c) 3650 mm d) 3680 mm