प्रदेश लोक सेवा आयोग

कर्णाली प्रदेश

इञ्जिनियरिङ्ग सेवा, सिभिल समूह अन्तर्गतका जनरल, हाईवे, स्यानीटरी, इरिगेशन र हाइड्रोपावर उप–समुह, पाँचौ तह, सव-इन्जिनियर पदको खुला प्रतियोगितात्मक परीक्षाको पाठ्यक्रम

पाठ्यक्रमको रुपरेखाः— यस पाठ्यक्रमको आधारमा निम्नानुसार चरणमा परीक्षा लिइने छः

लिखित परीक्षा — पूर्णाङ्कः— १००

अन्तर्वार्ता — पूर्णाङ्कः— २०

प्रथम चरणः- लिखित परीक्षा योजना (Examination Scheme)

विषय	पूर्णाङ्क	उत्तीर्णाङ्क	परीक्षा प्रणाली	प्रश्न संख्या x अङ्क भार	समय
सेवा सम्बन्धी	१००	४०	वस्तुगतः बहुवैकल्पिक (Multiple Choice)	७० प्रश्न x १ अङ्क = ७०	१ घण्टा ३० मिनेट
			विषयगतः छोटो उत्तर (Short Answers)	६ प्रश्न x ५ अङ्क = ३०	

द्वितीय चरण

विषय	पूर्णाङ्क	परीक्षा प्रणाली
व्यक्तिगत अन्तर्वार्ता	२०	मौखिक

<u>द्रष्टव्यः</u>

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

२. लिखित परीक्षाको वस्तुगत र विषयगत प्रश्नहरुको लागि छुट्टा छुट्टै उत्तरपुस्तिका परीक्षा सुरु हुनु अगावै दिइनेछ। परीक्षार्थीले वस्तुगत र विषयगत प्रश्नहरुको उत्तर सम्बन्धित उत्तरपुस्तिकामा लेख्नुपर्नेछ।

३. पाठ्यक्रमका एकाईवाट निम्नानुसार प्रश्नहरु सोधिनेछन् ।

एकाई	१	२	३	४	५	६	७	८	९	१०	११	१२	१३	१४
वस्तुगत	५	५	५	४	५	५	७	७	७	७	४	६	३	
विषयगत	१			१			१		१		१		१	

४. वस्तुगत बहुवैकल्पिक (Multiple Choice) प्रश्नहरुको उत्तर सही दिएका प्रत्येक सही उत्तर बापत १ (एक) अङ्क प्रदान गरिनेछ भने 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 ।

५. यस पाठ्यक्रममा जेसुकै लेखिएको भए तापनि पाठ्यक्रममा परेका ऐन, नियमहरु तथा नीतिहरु परीक्षाको मिति भन्दा ३ महिना अगाडि (संशोधन भएका वा संशोधन भई हटाईएका वा थप गरी संशोधनभई) कायम रहेकालाई यस पाठ्क्रममा परेको सम्झनु पर्दछ ।

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

७. पाठ्यक्रम लागू मितिः– २०७८।५।२५

विषयः 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 levelling
     - 1.2.2. Levelling instruments and accessories
     - 1.2.3. Principles of levelling
   - 1.3. Theodolite, Total station and Traverse surveying
     - 1.3.1. Basic difference between Theodolites and Total station
     - 1.3.2. Temporary adjustments
     - 1.3.3. Fundamental lines and desired relations
     - 1.3.4. Tacheometry: stadia method
     - 1.3.5. Trigonometric levelling
     - 1.3.6. Checks in closed traverse
   - 1.4. Contouring
     - 1.4.1. Characteristics of contour lines
     - 1.4.2. Methods of contouring
     - 1.4.3. Contour plotting
   - 1.5. Setting Out
     - 1.5.1. Small buildings
     - 1.5.2. 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. Shear force and bending moment
3.2.2. Thrust, shear force 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 fluid: elevation energy, Kinetic energy, potential energy, internal energy

4.3. Measurement of Discharge
4.3.1. Weirs and notches
4.3.2. Discharge formulae

4.4. Flows
4.4.1. Characteristics of pressurized flow and open channel flow
4.4.2. Head losses

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. Foundations and their types
  - 5.6.2. Terzaghi's general bearing capacity formulae 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
   - 6.5. Steel structure
     - 6.5.1. Introduction of steel
     - 6.5.2. Properties and uses of steel as structural member
     - 6.5.3. Advantage and disadvantage
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. Measures to prevent dampness
7.4. Concrete Technology
    7.4.1. Constituents of cement concrete
    7.4.2. Grading of aggregates
    7.4.3. Concreting equipments
    7.4.4. Concrete mixes and admixture
    7.4.5. Water cement ratio
    7.4.6. Factors affecting strength of concrete
    7.4.7. Formwork
    7.4.8. Curing
7.5. Wood work
    7.5.1. Frame and shutters of door and window
    7.5.2. Timber construction of upper floors
7.6. Flooring and Finishing
    7.6.1. Floor finishes: brick, concrete, flagstone
    7.6.2. Plastering
7.7. Modern construction technology
    7.7.1. Aluminum, PVC door and window, type and uses
    7.7.2. Prefabricated structure type and uses
    7.7.3. Autoclated Aerated Concrete (AAC) blocks and uses

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 artesian springs, shallow and deep wells; infiltration galleries
    8.1.3. Drinking water quality and it's parameters
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

8.3. 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. Common latrine types
8.4.2. Design of septic tank
8.4.3. Fecal sludge management, collection, transportation, treatment and disposal

9. Irrigation Engineering

9.1. General
9.1.1. Advantages and Disadvantages of irrigation

9.2. Crop water requirement
9.2.1. Crop season and principal crops
9.2.2. Base period
9.2.3. Duty and delta

9.3. Flow in 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

9.4. Basic principle of integrated water resource management

10. Highway Engineering

10.1. General
10.1.1. Introduction of transportation systems
10.1.2. Historic development of roads
10.1.3. Classification of roads 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. Super elevation

- 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. Bridge
- 10.6.1. T-beam bridge
- 10.6.2. Timber bridge

10.7. Road Maintenance and Repair
- 10.7.1. Type of maintenance works

10.8. Suspension and Suspended bridges

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 and district rates

11.3. Specifications and it's uses

11.4. Valuation
- 11.4.1. Methods of valuation
- 11.4.2. Basic knowledge of standard formats

12. Construction Management

12.1. Organization
- 12.1.1. Need of organization
- 12.1.2. Responsibilities of a civil sub-engineer
- 12.1.3. Relation between Client, Contractor and Consultant (Engineer)

12.2. Site Management
- 12.2.1. Preparation of site plan
- 12.2.2. Measures to improve labor efficiency
- 12.2.3. Occupational safety and health

12.3. Contract Procedure
- 12.3.1. Contracts and it's types

12.3.2. Departmental works and day-work
12.3.3. Bid and notice of invitation for bids
12.3.4. Earnest money and security deposit
12.3.5. Preparation before inviting bid
12.3.6. Contract agreement
12.3.7. Conditions of contract
12.3.8. 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 scheduling
12.5.2. Equipment and materials schedule
12.5.3. Construction stages and operations
12.5.4. Bar chart

13. General
13.1. Water resources in Karnali province
13.2. Hydro-power potential of Karnali province
13.3. Drinking water supply and sanitation status of Karnali province
13.4. Irrigation development in Karnali province
13.5. Challenges in infrastructure development in Karnali province

14. Civil Service Act, 2049 & Regulation, 2050 (conduct, punishment and leave to which civil employee is entitled)

Model Questions

Objective Questions

1. Contour interval is proportional to:
   a) Directly proportional to the scale of map
   b) Inversely proportional to the scale of map
   c) Directly proportional to the flatness of the ground
   d) d)None of the above
2. The bench mark of a point is 500 m. Back sight reading at bench mark is 2.2m and fore sight reading of a point "A" is 2.1 m. What is the RL of point A?
   a) 500.0 m b) 502.2 m
   c) 502.1 m d) 500.1 m

3. Slate is a metamorphic rock formed from the structural change of:
   a) Shale b) Granite
   c) Sand stone d) Marble
4. Excess of alumina in a Brick causes:
   a) Impermeability b) Cracking and warping on drying
   c) Brittleness d) None of the above
5. The maximum deflection of a simply supported beam subjected to concentrated load "W" at the midpoint is:
   a) $WL^3/8EI$ b) $WL^3/48EI$
   c) $5WL^3/48EI$ d) $WL^2/48EI$
6. Hydraulic gradient line for pressure channel flow is:
   a) Below water level b) Same as water level
   c) Above water level d) All of above
7. The maximum water content at which reduction in water content does not cause a decrease in volume of soil mass is known as:
   a) Liquid limit b) Plastic limit
   c) Shrinkage limit d) Ductile limit
8. Quick sand is:
   a) Type of sand
   b) Condition in which a cohesion less soil losses its shear strength.
   c) Moist sand condition
   d) Coarse sand
9. The maximum spacing between longitudinal bars in column is:
   a) 300 mm b) 400 mm
   c) 500 mm d) 600 mm
10. The moment of resistance of an under reinforced section is computed on the basis of:
   a) Compressive stress developed in concrete
   b) Tensile stress developed in steel
   c) Both of above
   d) None of above
11. Cavity wall:
   a) have lesser dead load for given wall thickness
   b) Provide better insulation for heat and sound
   c) Prevent dampness from entering the building
   d) All of the above

12. Slump value of concrete for Beam and Slab is:

a) 0-25 b) 25-50

c) 50-100 d) 100-150

13. Turbidity is measured on:

a) Standard silica scale b) Standard cobalt scale

c) Diagonal Scale d) None of the above

14. The discharge through trapezoidal channel is maximum when:
    a) Half of top width = sloping side
    b) Top width = sloping side
    c) Top width = half of sloping side
    d) Top width = 1.5 time sloping side

15. Radius of the curve is decided based on:

a) Design speed b) Super elevation

c) coefficient of friction d) All of the above

16. Stopping sight distance is always:
    a) More than overtaking sight distance
    b) Less than overtaking sight distance
    c) Equal to overtaking sight distance
    d) None of the above

17. The number of masons required per cubic meter of stone masonry is:

a) 1.0 b)1.2

c) 1.4 d) 1.5

18. The method of valuation of building generally used by commercial banks is:

a) Plinth area cost b) Cubic Area cost

c) Detailed item wise cost d) Real construction cost

19. For the execution of the work, work plan is prepared by:

a) Consultant b) Financial institution

c) Client d) Contractor

20. निजामाती सेवा नियमावली अनुसार बिरामी बिदा बापत एक बर्षमा कति दिन बिदा पाइन्छ?

a) ६ दिन b) १२ दिन

c) १८ दिन d) २४ दिन

Subjective Questions:

1) Explain about the different types of bonds on brick wall with sketches. (5)
2) Now days Aluminum door and Window frame are very common, explain the advantages and disadvantages of Aluminum over wooden frame. (5)
3) A 4m high column is effectively held in position at both ends and restrained against rotation at one end. Its diameter is restricted to 40 cm. Calculate the reinforcement if it is required to carry a factored axial load of 1500 KN. Use M20 mix and Fe250 grade steel. (5)
4) Why overtaking zones are provided on Roads and according to Nepal Road Standard what are the requirements of the overtaking zones? (2+3)
5) What is Contract? Explain the advantages of Turnkey contract over the item rate contract. (2+3)
6) निजामती सेवा नियमावली अनुसार भविष्यमा सरकारी सेवामा अयोग्य नठहरिने गरि बर्खास्त कुन कुन अवस्थामा दिने व्यवस्था छ ?