

प्रदेश लोक सेवा आयोग

प्रदेश नं. १, विराटनगर

स्थानीय सरकारी सेवा अन्तर्गत प्राविधिक तर्फ इञ्जिनियरिङ्ग सेवा, सिभिल समूह, अधिकृतस्तर छैठौं तहको (इञ्जिनियर) पदको खुला प्रतियोगितात्मक परीक्षाको पाठ्यक्रम

पाठ्यक्रमलाई निम्नानुसार विभाजन गरिएको छः

प्रथम चरणः-	लिखित परीक्षा (Written Examination)	पूर्णाङ्कः २००
द्वितीय चरणः-	(क) सामूहिक परीक्षण (Group Test)	पूर्णाङ्कः १०
	(ख) अन्तर्वार्ता (Interview)	पूर्णाङ्कः ३०

परीक्षा योजना (Examination Scheme)

प्रथम चरणः लिखित परीक्षा (Written Examination)

पूर्णाङ्कः २००

पत्र	विषय	पूर्णाङ्क	उतीर्णाङ्क	परीक्षा प्रणाली	प्रश्नसंख्या x अङ्क	समय
प्रथम	सिभिल इञ्जिनियरिङ्ग सम्बन्धी	१००	४०	वस्तुगत बहुवैकल्पिक प्रश्न (MCQs)	१०० प्रश्न x १ अङ्क	१ घण्टा १५ मिनेट
द्वितीय	जनरल इन्जिनियरिङ्ग	१००	४०	विषयगत (Subjective)	१० प्रश्न x १० अङ्क	३ घण्टा

द्वितीय चरणः सामूहिक परीक्षण (Group Test) र अन्तर्वार्ता (Interview)

पूर्णाङ्कः ४०

विषय	पूर्णाङ्क	परीक्षा प्रणाली	समय
सामूहिक परीक्षण (Group Test)	१०	समूहमा व्यक्तिगत प्रस्तुति (Individual Presentation in Group)	३० मिनेट
अन्तर्वार्ता (Interview)	३०	मौखिक (Oral)	-

द्रष्टव्यः

- लिखित परीक्षाको माध्यम भाषा नेपाली वा अंग्रेजी अथवा नेपाली र अंग्रेजी दुवै हुनेछ ।
- प्रश्नपत्र अङ्ग्रेजी भाषामा हुनेछ ।
- प्रथमपत्र र द्वितीयपत्रको लिखित परीक्षा छुट्टाछुट्टै 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 ।
- बहुवैकल्पिक प्रश्नहरू हुने परीक्षामा कुनै पनि प्रकारको क्यालकुलेटर (Calculator), मोबाइल फोन वा अन्य विद्युतीय उपकरण प्रयोग गर्न पाइने छैन ।

६. विषयगत प्रश्नहरूको हकमा तोकिएको अंकको एउटा लामो प्रश्न वा एउटै प्रश्नका दुई वा दुईभन्दा बढी भाग (Two or more parts of a single question) वा एउटा प्रश्न अन्तर्गत दुई वा बढी टिप्पणीहरू (Short notes) सोध्न सकिने छ ।
७. द्वितीय पत्रमा (विषयगत प्रश्न हुनेको हकमा) प्रत्येक खण्डका लागि छुट्टाछुट्टै उत्तर पुस्तिकाहरू हुनेछन्। परिक्षार्थीले प्रत्येक खण्डका प्रश्नहरूको उत्तर सोही खण्डको उत्तर पुस्तिकामा लेख्नुपर्नेछ ।
८. लिखित परीक्षामा सोधिने प्रश्न संख्या प्रथम पत्रको लागि यथासम्भव देहाय बमोजिम हुनेछ ।

प्रथमपत्रका एकाई	1	2	3	4	5	6	7	8	9
प्रश्न संख्या	18	14	12	12	10	12	8	6	8

९. द्वितीय पत्रको पाठ्यक्रमका एकाईहरूबाट सोधिने प्रश्नहरूको संख्या द्वितीयपत्रको पाठ्यक्रममा उल्लेख भए अनुसार हुनेछ ।
१०. यस पाठ्यक्रम योजना अन्तर्गतका पत्र तथा विषयका विषयवस्तुमा जे सुकै लेखिएको भएता पनि पाठ्यक्रममा परेका कानून, ऐन, नियम तथा नीतिहरू परीक्षाको मिति भन्दा ३ महिना अगाडि (संशोधन भएका वा संशोधन भई हटाइएका वा थप गरी संशोधन भई) कायम रहेकालाई यस पाठ्यक्रममा परेको सम्झनु पर्दछ ।
११. प्रथम चरणको परीक्षाबाट छनौट भएका उम्मेदवारहरूलाई मात्र द्वितीय चरणको सामूहिक परीक्षण र अन्तर्वार्तामा सम्मिलित गराइनेछ ।
१२. लिखित परीक्षा र अन्तिम चरणको सामूहिक परीक्षण तथा अन्तर्वार्ताको कुल अङ्क योगका आधारमा अन्तिम परीक्षाफल प्रकाशित गरिनेछ ।
१३. पाठ्यक्रम लागू मिति: २०७७/१०/११

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First Paper: Basic Civil Engineering

1. Structure Analysis and Design

- 1.1 Stresses and strains; theory of torsion and flexure; moment of inertia
- 1.2 Analysis of beams and frames: Bending moment, shear force and deflection of beams and frames: determinate structure - Energy methods; three hinged systems, indeterminate structures- slope deflection method and moment distribution method; use of influence line diagrams for simple beams, unit load method
- 1.3 Reinforced concrete structures: Difference between working stress and limit state philosophy, analysis of RC beams and slabs in bending, shear, deflection, bond and end anchorage, Design of axially loaded columns; isolated and combined footings, introduction to pre-stressed concrete
- 1.4 Steel and timber structures: Standard and built-up sections: Design of riveted, bolted and welded connections, design of simple elements such as ties, struts, axially loaded and eccentric columns, column bases, Design principles on timber beams and columns

2. Construction Materials

- 2.1 Properties of building materials: physical, chemical, constituents, thermal etc.
- 2.2 Stones-characteristics and requirements of stones as a building materials
- 2.3 Ceramic materials: ceramic tiles, Mosaic Tile, brick types and testing etc.
- 2.4 Cementing materials: types and properties of lime and cement; cement mortar tests
- 2.5 Metals: Steel; types and properties; Aluminum
- 2.6 Timber and wood: timber trees in Nepal, types and properties of wood
- 2.7 Miscellaneous materials: Asphaltic materials (Asphalt, Bitumen and Tar); paints and varnishes; polymers
- 2.8 Soil properties and its parameters
- 2.9 Alternative materials / technology

3. Concrete Technology

- 3.1 Constituents and properties of concrete (physical and chemical)
- 3.2 Water cement ratio
- 3.3 Grade and strength of concrete, concrete mix design, testing of concrete
- 3.4 Mixing, transportation pouring and curing of concrete
- 3.5 Admixtures
- 3.6 High strength concrete
- 3.7 Pre-stressed concrete technology
- 3.8 Handling Of Ready-mix Concrete (RMC)

4. Construction Management

- 4.1 Construction scheduling and planning: network techniques, bar charts and computer aided construction management
- 4.2 Contractual procedure and management: types of contract, tender and tender notice, preparation of bidding (tender) document, contractor's pre-qualification, evaluation of tenders and selection of contractor, contract negotiation, contract acceptance, condition of contract; quotation and direct order, classifications of contractors; dispute resolution
- 4.3 Material management: procurement procedures and materials handling
- 4.4 Quality control including different types of Laboratory tests
- 4.5 Utility Maintenance and General concept of Retrofitting
- 4.6 Health, safety and insurance
- 4.7 Project monitoring and evaluation
- 4.8 Quality assurance plan
- 4.9 Variation and changes
- 4.10 Use of construction equipment
- 4.11 Construction site Safety Management

5. Estimating and Costing, Valuation and Specification

- 5.1 Types of estimates and their specific uses
- 5.2 Methods of calculating quantities
- 5.3 Key components of estimating norms and rate analysis
- 5.4 Preparation of bill of quantities
- 5.5 Purpose and importance of specification
- 5.6 Purpose, principles and methods of valuation

6. Drawing Techniques

- 6.1 Drawing sheet composition and its essential components
- 6.2 Suitable scales, site plans and location plans, preliminary drawings, conceptual and working drawings
- 6.3 Theory of projection drawing: perspective, orthographic and axonometric projection; first and third angle projection
- 6.4 Drafting tools and equipment; conventions and symbols
- 6.5 Topographic, electrical, plumbing and structural drawings
- 6.6 Techniques of free sketches drawing
- 6.7 Basic concept of Computer Aided Design (CAD)

7. Engineering Survey

- 7.1 Introduction and basic principles
- 7.2 Linear measurements: techniques; chain, tape, ranging rods and arrows; representation of measurement and common scales; sources of errors; effect of slope and slope correction; correction for chain and tape measurements; Abney level and clinometers
- 7.3 Compass and plane table surveying: bearings; types of compass; sources of errors of compass survey; principles and methods of plane tabling
- 7.4 Leveling and contouring: Principle of leveling; temporary and permanent adjustment of level; bench marks; booking methods and their reductions; longitudinal and cross sectioning; reciprocal leveling; trigonometric

- leveling; contour interval and characteristics of contours; methods of contouring
- 7.5 Theodolite traversing: need of traverse and its significance; computation of coordinates; adjustment of closed traverse; closing errors
- 7.6 Uses of Total Station, Electronic Distance Measuring Instruments & GPS
- 7.7 Basic concept of Geographical Information System

8. Engineering Economics

- 8.1 Benefit cost analysis, cost classification, sensitivity analysis, internal rate of return, time value of money
- 8.2 Economic equilibrium, demand, supply and production, net present value, financial and economic evaluation

9. Professional Practices and Legislations

- 9.1 Ethics and professionalism: code of conduct and guidelines for professional engineering practices
- 9.2 Nepal Engineering Council Act, 2055; and regulations, 2056
- 9.3 Relation with clients, contractor and professionals
- 9.4 Public procurement concept and practices for works, goods and services and its importance
- 9.5 Public Procurement Act, 2063 and Public Procurement Regulation, 2064 including subsequent amendments and provincial procurement rules (specially province 1)
- 9.6 The Constitution of Nepal (From Part 1 to 5, 13, 14, 15, 16, 17, 18, 19 & 20; and Schedules)
- 9.6 Local Government Operation Act, 2074
- 9.7 Prevailing acts of cross cutting issues like Environment Protection Act, 2076, Disaster Risk and Management Act, 2074, Gender Equality and Social Inclusion Policy/Strategies/Guidelines of Government of Nepal, etc.

Model Questions

1. For continuous beam span up to 10 m the span to effective depth ratio should not be greater than;

A. 7	B. 20
C. 26	D. 32

2. Where the steel is directly exposed to weather and fully accessible for cleaning and repainting, the thickness shall be not less than,

A. 10 mm	B. 8 mm
C. 6 mm	D. 4 mm

3. The thickness of RCC column footing is determined with due consideration of

A. Punching shear and bending moment
B. Punching shear, diagonal shear and bending moment

- C. Diagonal shear and bending moment
 - D. Punching shear and diagonal shear
4. The property of material due to which a material can resist deformation is
- A. Strength
 - B. Stiffness
 - C. Tenacity
 - D. ductility
5. Shearing strength of cohesion less soil depends upon
- A. dry density
 - B. void ratio
 - C. loading rate
 - D. normal stress
6. During transportation of concrete the separation of coarse aggregate from mortar is called,
- A. separation
 - B. creeping
 - C. segregation
 - D. bleeding
7. For the construction of mass concrete structure, the cement which is particularly useful is
- A. Ordinary Portland cement
 - B. Portland pozzolana cement
 - C. Quick setting cement
 - D. Rapid hardening cement

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द्वितीय पत्र :- जनरल सिभिल इञ्जिनियरिङ्ग सम्बन्धी

Section (A)- 30 Marks

1. Transportation and Trail Bridge

- 1.1 Transportation system and its classification
- 1.2 Transportation planning: rationale, types and its philosophy.
- 1.3 Road transport and road construction in Nepal.
- 1.4 Classification of roads in Nepal (NRS and IRC)
- 1.5 General principles of road network planning.
- 1.6 Feasibility study of road projects.
- 1.7 Alignment, engineering survey and its stages.
- 1.8 Geometric design of roads: map study, element of cross-section and highway alignment, design of horizontal curve, super elevation, transition curve, vertical curves, right of way.
- 1.9 Drainage consideration in roads:
 - 1.9.1. Introduction and design of culverts and minor bridges, cross drainage structures, subsurface drainage system.
- 1.10. Special consideration in Hill roads design:
 - 1.10.1. Problems associated with hill roads construction
 - 1.10.2. Route location, hairpin bends and special structures.
- 1.11 Types and Design of pavements
- 1.12 Bioengineering practices along hill side
- 1.13 Activities and techniques in road construction in rural roads
- 1.14 Maintenance, repair and rehabilitation of roads.
- 1.15 Basic knowledge on design, construction and maintenance of suspended and suspension bridge in Nepal.
- 1.16 Role of social mobilization in rural road development.
- 1.17 Low-cost road construction
- 1.18 Typical considerations for designing urban and rural roads, Nepal Urban Road Standard-2076

Section (B) - 20 Marks

2. Water Supply and Sanitation

- 2.1 Rural and community-based water supply system.
- 2.2 Water supply sources and their management.
 - 2.2.1 Surface water
 - 2.2.2 Ground water
- 2.3 Selection of source.
- 2.4 Water quality and treatment, water demand and supply, source protection
- 2.5 Intakes, collection chamber and break pressure tanks.
- 2.6 Reservoir and distribution system.

- 2.7 Intakes, Pipeline design, design of transmission and distribution system, reservoir design.
- 2.8 Pipe and fittings: Pipe materials, pipe laying and fittings.
- 2.9 Operation and maintenance of water supply systems
- 2.10 Sanitation, wastewater and solid waste management:
 - 2.10.1 On-site sanitation system
 - 2.10.2 Types of sewerage system, design and construction of sewers.
 - 2.10.3 Types, characteristics, sources, quantity, generation, collection, transportation and disposal of solid waste, concept of reduce, reuse and recycle of solid wastes
 - 2.10.4 Sanitary landfill, Dumping site, incineration, composting, waste to energy etc.
- 2.11 Public Health Engineering- Dealing with Epidemics and Pandemics (eg. Quarantine and Isolation centers), Pathogens etc.

Section C - 30 Marks

3. Energy System

10 Marks

- 3.1 Hydrological study, planning and design of small hydropower projects.
- 3.2 Head works, dams, spillways, surge tanks, stilling basin etc.
- 3.3 River diversion works.
- 3.4 Biogas- Introduction.
- 3.5 Alternative Energy systems in Nepal, Concept of Energy Efficient Designs and Energy Audit

4. Irrigation and River training works

20 Marks

- 4.1 Status of irrigation development in Nepal.
- 4.2 Methods of irrigation and their suitability.
- 4.3 Design of irrigation canals.
- 4.4 Operation and maintenance of irrigation systems
- 4.5 Management of Farmers managed irrigation system.
- 4.6 Preventive and remedial measures of water logging.
- 4.7 Flood control, its necessity and flood mitigation measures.
- 4.8 River training works.
- 4.9 Specific considerations in design, operation and management of hill irrigation systems

Section D - 20 Marks

5. Housing, building and urban planning

10 Marks

- 5.1 Present status and practices of building construction in Nepal
- 5.2 Specific considerations in design and construction of buildings in Nepal
- 5.3 Indigenous technology in building design and construction
- 5.4 Local and Modern building construction material in Nepal
- 5.5 Community buildings: School and hospital buildings and their design considerations

- 5.6 Urban Planning needs, challenges and practices (basic concept of Integrated Action Plans, Periodic Plans and Integrated Urban Development Plans) in Nepal
- 5.7 Nepal National Building Code 2060 (Updated 2077)

6. Technology, Environment and civil society 10 Marks

- 6.1 Technological development in Nepal
- 6.2 Promotion of local technology and its adaptation
- 6.3 Environmental Impact Assessment, Initial Environmental Examination, Global-warming phenomena
- 6.4 Types of sources of pollution: point / non-point (for air and water)
- 6.5 Social mobilization in local infrastructure development and utilization in Nepal
- 6.6 Participatory approach in planning, implementation, maintenance and operation of local infrastructure including the concept of Public Audit and Social Audit

Model Questions

Section 'A'

1. What are the specific considerations in hill roads design? Explain the problems associated with hill roads construction in Nepal. [10]
2. Explain the role of social mobilization in rural road development. Discuss the advantages of social mobilization in road construction in rural areas of Nepal. [10]

Section 'B'

3. What does it mean by solid waste management? Explain in detail about the methods of solid waste management with relevant examples. [10]
4. Discuss different types of water supply system in urban areas of Nepal with neat sketches. [10]

Section 'C'

5. Explain alternative energy system and discuss its scope in context of Nepal. Explain why energy audit is necessary. [10]
6. Explain the status of irrigation development in Nepal. Discuss the challenges and opportunity of irrigation system in hilly areas of Nepal. [10]

Section 'D'

7. Explain in detail about the specific consideration in design and construction of buildings in Nepal. [10]
8. Discuss in brief about the participatory approach in planning, implementation, maintenance and operation of local infrastructure in Nepal. [10]