

## उर्लावारी नगरपालिका कार्यालय, पदपूर्ति समिति

प्राविधिक सेवा, अधिकृत स्तर छैतौं तह, सिभिल इन्जिनियर पदको खुला प्रतियोगितात्मक लिखित परीक्षाको पाठ्यक्रम

पाठ्यक्रमको रूपरेखा :-

यस पाठ्यक्रमको आधारमा निम्नानुसार दुई चरणमा परीक्षा लिइने छ :

प्रथम चरण :- लिखित परीक्षा पूर्णाङ्क :- २०० द्वितीय चरण :- अन्तर्वार्ता पूर्णाङ्क :- ३० प्रथम चरण – लिखित परीक्षा योजना (Examination Scheme)

पत्र	विषय	पूर्णाङ्क	उत्तीर्णाङ्क	परीक्षा प्रणाली	प्रश्न संख्या×अङ्कभार	समय
प्रथम	सिभिल इन्जिनियरिङ्ग सम्बन्धी विषय	१००	४०	वस्तुगत बहुउत्तर (Multiple Choice)	१००×१=१००	१ घण्टा १५ मिनेट
द्वितीय	उपसमूह सम्बन्धी विषय	१००	४०	विषयगत - Subjective	१०×१०=१००	३ घण्टा

द्वितीय चरण

विषय	पूर्णाङ्क	परीक्षा प्रणाली
व्यक्तिगत अन्तर्वार्ता	३०	मौखिक

परीक्षा प्रणाली

- लिखित परीक्षाको माध्यम भाषा नेपाली वा अंग्रेजी अथवा नेपाली र अंग्रेजी दुवै हुन सक्नेछ ।
- पाठ्यक्रमको प्रथम र द्वितीयपत्रको विषयवस्तु फरक फरक हुनेछन ।
- प्रथम तथा द्वितीय पत्रको विषयवस्तु पाठ्यक्रम माथि उल्लेख भए बमोजिम हुनेछ ।
- प्रथम र द्वितीय पत्रको लिखित परीक्षा छुट्टाछुट्टै हुनेछ ।
- प्रथमपत्रका पाठ्यक्रमका एकाईहरु बाट सोधिने प्रश्नहरुको संख्या निम्नानुसार हुनेछ । द्वितीयपत्रको पाठ्यक्रमका एकाईहरुबाट सोधिने प्रश्नहरुको संख्या द्वितीय पत्रको पाठ्यक्रममा उल्लेख भएअनुसार हुनेछ ।
- प्रथमपत्रमा वस्तुगत बहुउत्तर (Multiple Choice) प्रश्नहरुको उत्तर सही दिएमा प्रत्येक सही उत्तर बापत १ (एक) अङ्क प्रदान गरिन छ भने गलत उत्तर दिएमा प्रत्येक गलत उत्तर बापत २० प्रतिशत अर्थात् ०.२ अङ्क कट्टा गरिनेछ । तर उत्तर नदिएमा त्यस बापत अङ्क दिइने छैन र अङ्क कट्टा पनि गरिने छैन ।
- द्वितीय पत्रको विषयगत प्रश्न का लागि तोकिएको १० अङ्कको प्रश्नहरुको हकमा १० अङ्कको एउटा लामो प्रश्न वा एउटै प्रश्नका दुई वा दुई भन्दा बढी भाग-Two or more parts of a single question वा एउटा प्रश्न अन्तर्गत दुई वा बढी टिप्पणीहरु (Short notes) सोध्न सकिने छ ।
- द्वितीयपत्रको पाठ्यक्रमलाई ५ वटा खण्ड/एकाईमा विभाजन गरिएको छ, ५ वटा खण्ड/एकाईको लागि ५ वटै उत्तर पुस्तिका दिइनेछ र परिक्षार्थीले प्रत्येक खण्ड/एकाईका प्रश्नहरुको उत्तर सोही खण्ड/एकाईको उत्तर पुस्तिकामा लेख्नु पर्नेछ ।

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९. यस पाठ्यक्रममा जेसुकै लेखिएको भएता पनि पाठ्यक्रममा परेका ऐन, नियमहरु परीक्षाको मितिभन्दा ३ (तीन) महिना अगाडि (संशोधन भएका वा संशोधनभई हटाइएका वा थप गरी संशोधन भई कायम रहेकालाई यस पाठ्यक्रममा रहेको सम्झनु पर्दछ ।
१०. प्रथम चरणको लिखित परीक्षाबाट छनौट भएका उम्मेदवारहरुलाई मात्र द्वितीय चरणको अन्तर्वार्तामा सम्मिलित गराइनेछ ।

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प्रथमपत्र :- सिभिल इन्जिनियरिङ्ग सम्बन्धी विषय

**1. Structure Analysis and Design 20%**

- 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 15%**

- 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; Alloys
- 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

**3. Concrete Technology 12%**

- 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

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3.4 Mixing, transportation pouring and curing of concrete

3.5 Admixtures

3.6 High strength concrete

3.7 Pre-stressed concrete technology

**4. Construction Management 12%**

4.1 Construction scheduling and planning: network techniques (CPM, PERT) and bar charts 4.2 Contractual procedure and management: types of contract, tender and tender notice, preparation of bidding (tender) document, contractors pre-qualification, evaluation of tenders and selection of contractor, contract acceptance, condition of contract; quotation and direct order, classifications of contractors; dispute resolution; muster roll

4.3 Material management: procurement procedures and materials handling

4.4 Cost control and quality control

4.5 Project maintenance

4.6 Occupational health and safety

4.7 Project monitoring and evaluation

4.8 Quality assurance plan

4.9 Variation, alteration and omissions

**5. Estimating and Costing Valuation and Specification 10%**

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, types and importance of specification

5.6 Purpose, principles and methods of valuation

**6. Drawing Techniques 10%**

6.1 Drawing sheet composition and its essential components

6.2 Suitable scales, site plans, preliminary drawings, working drawings etc

6.3 Theory of projection drawing: perspective, orthographic and axonometric projection; first and third angle projection

6.4 Drafting tools and equipments

6.5 Drafting conventions and symbols

6.6 Topographic, electrical, plumbing and structural drawings

6.7 Techniques of free hand drawing

## **7. Engineering Survey 8%**

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; problems and 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 and Electronic Distance Measuring Instruments

## **8. Engineering Economics 8%**

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

## **9. Professional Practices 5%**

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 fellow professionals

9.4 Public procurement practices for works, goods and services and its importance

**द्वितीयपत्र :- जनरल सम्बन्धी विषय**

**Section A – 20 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. Road Pavement: Types of pavement and their applicability in hill roads, Design of pavement,
- 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

**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

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- 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 wastes.
- 2.10.4 Sanitary landfill, incineration, composting etc.
- 2.11 Environmental health engineering- Epidemiology, pathogens (Bacteria, Virus, Helminthes, Protozoa)

### **Section C – 20 Marks**

#### **3. EnergySystem**

- 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

#### **4. Irrigation and River training works.**

- 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.**

- 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 and challenges in Nepal.

#### **6. Technology, Environment and civil society.**

- 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

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## Section -E 20 Marks

### ७. स्थानीय निकायसंग सम्बन्धित ऐन, नियम तथा निर्देशिकाहरु

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| ७.१ | स्थानीय स्वायत्त शासन ऐन, २०५५ (भाग १, ३ र ५) तथा नियमावली, २०५६ (भाग १, ३, ५ र ६) |
| ७.२ | स्थानीय निकाय (आर्थिक प्रशासन) नियमावली, २०६४                                      |
| ७.३ | फोहोमैला व्यवस्थापन ऐन २०६८ तथा नियमावली २०७०.                                     |
| ७.४ | स्थानीय निकाय श्रोत परिचालन तथा व्यवस्थापन कार्यविधि, २०६९                         |
| ७.५ | वस्ती विकास, सहरी योजना तथा भवन निर्माण सम्बन्धि आधारभूत निर्माण मापदण्ड २०७२      |
| ७.६ | भवन ऐन, २०५५   |
| ७.७ | National Building Code , 2003  |
| ७.८ | भ्रष्टचार निवारण ऐन, २०५९  |