

# सुन्दरहरैचा नगरपालिका

नगर कार्यपालिकाको कार्यालय,

विराटचौक, मोरङ

१ नं. प्रदेश, नेपाल

स्थानीय सेवा अन्तर्गत प्राविधिक तर्फ इन्जिनियरिङ सेवा, सिभिल समूह, अधिकृतस्तर छैठौ तहको (इन्जिनियर)

पदको पाठ्यक्रम

पाठ्यक्रमलाई निम्नानुसार विभाजन गरिएको छः

प्रथम चरण :- लिखित परीक्षा (Written Examination)

द्वितीय चरण :- अन्तर्वार्ता (Interview)

## परीक्षा योजना (Examination Scheme)

प्रथम चरण: लिखित परीक्षा (Written Examination)

पूर्णाङ्क: २००

पत्र	विषय	पूर्णाङ्क	उत्तीर्णाङ्क	परीक्षा प्रणाली	प्रश्नसंख्या x अङ्क	समय
प्रथम	सेवा/इन्जिनियरिङ्ग सम्बन्धी	१००	४०	वस्तुगत बहुवैकल्पिक प्रश्न (MCQs)	५० प्रश्न x २ अङ्क	४५ मिनेट
द्वितीय	सामान्य ज्ञान तथा व्यवस्थापन सम्बन्धी	१००	४०	वस्तुगत बहुवैकल्पिक प्रश्न (MCQs)	५० प्रश्न x २ अङ्क	४५ मिनेट

द्वितीय चरण: अन्तर्वार्ता

पूर्णाङ्क: ३०

विषय	पूर्णाङ्क	परीक्षा प्रणाली	समय
अन्तर्वार्ता	३०	मौखिक	-

प्रथम चरण: लिखित परीक्षा (Written Examination) को पाठ्यक्रम :

प्रथम पत्र :

## सेवा/इन्जिनियरिङसम्बन्धी - 100 marks

### **First Paper: i. 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 material
- 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; Aluminium
- 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 prequalification, 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.

## **First Paper: ii. General Civil Engineering**

### **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

### **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 centres), Pathogens etc.

### **3. Energy System**

- 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**

- 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

### **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, 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**

- 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

**द्वितीय पत्र :**

### **सामान्य ज्ञान तथा व्यवस्थापनसम्बन्धी – 100 marks**

- १. सामान्य ज्ञान
- २. नेपालको संविधान
- ३. १५ औं आवधिक योजना
- ४. स्थानीय सरकार संचालन ऐन, २०७४
- ५. सार्वजनिक खरिद ऐन, २०६३ तथा सार्वजनिक खरिद नियमावली, २०६४
- ६. आर्थिक कार्यविधि तथा वित्तिय उत्तरदायित्व ऐन तथा नियमावली २०७६
- ७. दिगो विकासका लक्ष्य
- ८. नेपालको इतिहास, भुगोल, राजनिति, वातावरण, हावापानी, संस्कृति विविधता सम्बन्धी सामान्य जानकारी
- ९. समसामयिक विषयवस्तु