# काठमाडौं महानगरपालिका कार्यालय
## पदपूर्ति समिति
### प्राविधिक सेवा, सहायक स्तर पांचौ तह, सवइन्जिन्यिर(सिभिल) पदको खुला प्रतियोगितात्मक लिखित परीक्षाको पाठ्यक्रमको पाठ्यक्रम

## पाठ्यक्रमको रुपरेखा

यस पाठ्यक्रमको आधारमा निम्नानुसार दुई चरणमा परीक्षा लिइने छ ।

प्रथम चरण: लिखित परीक्षा पूर्णाङ्क-१००

द्वितीय चरण: अन्तर्वार्ता पूर्णाङ्क-२०

| चरण | परीक्षा | विषय | पूर्णाङ्क | प्रश्न संख्या | समय | परीक्षा प्रणाली | उत्तीर्णाङ्क |
|---|---|---|---|---|---|---|---|
| १ | लिखित | सेवा सम्बन्धी | १०० | १०० | १ घण्टा १५ 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. यस पाठ्यक्रममा जेसुकै लेखिएको भएता पनि पाठ्यक्रममा परेका विषयवस्तु मध्येबाट इन्जिनियरिड. सम्बन्धी विषयबाट ८० अंक र स्थानीय निकायको प्रशासनबाट २० अंक अंकभार कायम गरिनेछ ।

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| प्रश्नपत्रका एकाई | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| प्रश्न संख्या | 8 | 7 | 3 | 5 | 5 | 3 | 5 | 6 |
| | | | | | | | | |
| प्रश्नपत्रका एकाई | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 |
| प्रश्न संख्या | 5 | 7 | 7 | 5 | 5 | 6 | 3 | 20 |

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समय :– १ घण्टा १५ मिनेट  प्रश्न संख्या :– १००  पूर्णाङ्क :१००

**1. Surveying (8%)**

**1.1 General: Definations, Terminology and basic Knowledge**

**1.2 Chain survey, it's importance and suitability**

**1.3 Levelling**

1.3.1 Methods of levelling
1.3.2 Levelling instruments and accessories
1.3.3 Principles of levelling

**1.4 Plane Tabling**

1.4.1 Equipments required
1.4.2 Methods of palne tabling
1.4.3 Two and three point problems

**1.5 Theodolite and Traverse surveying**

1.5.1 Basic difference between different theodolites
1.5.2 Temporary adjustments of theodolites
1.5.3 Fundamental lines and desired relations
1.5.4 Comparison between different methods of Survey

**1.6** Tacheometry: stadia method

1.7 Trigonometric Levelling: Checks in closed traverse

1.8 **Contouring**

1.8.1 Characteristics of contour lines
1.8.2 Method of locating contours
1.8.3 Contour plotting

**1.9 Setting Out**

1.9.1 Small buildings
1.9.2 Simple curves
1.9.3 Offsets

**2. Construction Materials (7%)**

**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

2.3 Admixtures
2.4 Clay and Clay Products
2.5 Brick: type, manufacture, laying, bonds
2.6 Paints and Varnishes

2.6.1 Type and selection

2.6.2 Preparation techniques
2.6.3 Use

**2.7 Bitumen**

2.7.1 Type
2.7.2 Selection
2.7.3 Use

2.8 Timber, Types of Timber, Seasoning of timber and its importance.

**3. Drawing Techniques (3%)**

3.1 Drawing sheets (Composition and components)
3.2 Suitable scales, site plans, prekiminary drawings, working etc, Techniques of free hand drawing
3.3 Theory of projection drawing, prespective, orthographic and axonometric projection, first and third angle projection
3.4 Drafting tools and equipments
3.5 Drafting conventions and symbols
3.6 Topographic, electrical, plumbing and structural drawings
3.7 Auto-CAD Drawing

**4. Mechanics of Materials and Structures(5%)**

4.1 Mechanics of Materials
4.2 Internal effects of loading, moment of inertia
4.3 Mechanics of Beams
4.4 Relation between shear force and bending moment
4.5 Simple Strut Theory

**5. Structural Design(5%)**

5.1 R.C. Sections in Bending
5.1.1 Under reinforced, over reinforced and balanced sections
5.1.2 Analysis of single and double reinforced rectangular sections
5.2 Shear and Bond for R.C. Sections
5.2.1 Shear resistance of a R.C. section
5.2.2 Types of Shear reinforcement and their design
5.2.3 Determination of anchorage length
5.3 Axially Loaded R.C. Columns
5.3.1 Short and long columns
5.3.2 Design of a rectangular column section
5.4 Design and Drafting of R.C. Structures
5.4.1 Singly and doubly reinforced rectangular beams
5.4.2 Simple one-way and two-way slabs
5.4.3 Axially loaded short and long columns

**6. Hydraulics (3%)**

6.1 General: Definitions etc.

6.2 Properties of fluid: mass, weight, specific weight, density, specific volume, specific gravity
6.3 Energy of flowing liquid: elevation energy, Kinetic energy, potential energy,
6.4 Measurement of Discharge: Weirs and notches; Discharge formulas
6.5 General Characteristics of pipe flow and open channel flow

**7. Soil Mechanics (5%)**

7.1 General
7.2 Soil types and classification; Three phase system of soil
7.3 Unit Weight: bulk density, saturated density, submerged density and dry density
7.4 Inter-relationship between specific gravity, void ratio, porosity, degree of saturation, percentage of air voids air content and density index
7.5 Soil Water Relation; Factors affecting permeability
7.6 Compaction of soil: Difference between compaction and consolidation of soil, Factors affecting soil compaction; Relation between dry density and moisture content; Optimum moisture content
7.7 Earth Pressures: Active and passive earth pressures; Theories of Earth pressure
7.8 Foundation Engineering: Bearing capacity formulas and their application

**8. Estimating and Costing, Valuation and Specifications (6%)**

8.1 General**:** Fundamentals, assumption and basis of Estimating; Difference methods of estimation, Units of work measurement
8.2 Rate Analysis**:** Basic knowledge of rate analysis norms; labour and Material Rates, Authorities to approve the rates
8.3 Cost estimation : Different items of Work, Standard Formats; authorities
8.4 Specifications : Interpretation of specifications
8.5 Valuation: Methods of valuation; Standard formats used by commercial commercial banks and NIDC

**9 Construction Management (5%)**

9.1 Organization**;**Need for organization**;** Responsibilities of a civil overseer**;** Coordination between Owner, Contractor and Engineer
9.2 Site Management; Preparation of site plan; Management of Labour, Material and machines (including Equipment and materials schedule) at site; Safety and environmental protection at site; Site register and minutes
9.3 Contract Procedure: Type of Contracts; Methods of Procurement of works; Tender Process; Earnest money and security deposit; Conditions of contract; Construction supervision
9.4 Office Administration: Accounts; Administrative approval and technical sanction; Familiarity with standard account keeping systems and formats of Covernment of Nepal

9.5 Contract administration and Control: Construction schedule; Quality assurance Plan; quality control; quality indicators and total quality management; Construction stages and operations; Evaluation and Billing; Hand-over, Completion report

9.6 Progress Monitoring : Monitoring schedule and reporting; Bar chart; Technical Auditing; Progress reporting

**10. Building Construction Technology (7%)**

10.1 Foundations

10.1.1 Subsoil exploration

10.1.2 Type and suitability of different foundations: Shallow, deep

10.1.3 Shoring and dewatering

10.1.4 Tentative Design of simple foundations

10.2 Walls

10.2.1 Type of walls and their suitability

10.2.2 Choosing wall thickness, Height to length relation

10.2.3 Use of scaffolding

**11 Concrete Technology(7%)**

11.1 Constituents of cement concrete

11.2 Grading of aggregates

11.3 Concreti mixes

11.4 Water cement ratio

11.5 Factors affecting strength of concrete

11.6 Form work

11.7 Curing

**12. Water Supply and Sanitation Engineering(5%)**

12.1 General: Definitions, Objectives of water supply system

12.2 Source of water and its selection: gravity and artisan springs, shallow and deep wells; infiltration galleries.

12.3 Design Aspects: Design Period, Daily water demand, Storage tank capacity

12.4 Sanitary Pipes: Seledtion and design of Pipe line; Hydraulic grade lin

12.5 Sewer & Excreta Disposal: Design; Quantily of sanitary sewage; Maximum, Minimum and Self cleansing velocity; Excreta Disposal, Pit latrine; Design of septic tank

**13. Irrigation Engineering, River Training and Landslide management (5%)**

13.1 General: Terms and Definitions; Necessity, Advantages and Disadvantages of irrigation; Status of Irrigation development in Nepal

13.2 Water Requirement: Idea about Consumptive use and water application efficiency; Crop season and principal crops; Base period; Critical water requirement assessment for Rice crop
13.3 Irrigation Canal systems: Idea about canal networks (Main, branch, tertiary etc);
13.4 Design of Irrigation Canals: Design velocities (Maximum and Minimum); Design discharge at head; Design of canal section based on Manning's formula
13.5 Head works and Spillways: Need and location of spillways; types of head works for Irrigation Scheme
13.6 Impact of Flood and Inundation Problem in Nepal; Mitigation measures
13.7 Type Design of River Trainign work
13.8 Landslides: Causes and Mitigation measures

**14. Highway Engineering(6%)**

14.1 General: Introduction to transportation systems; Historic development of roads; Classification of road in Nepal
14.2 Road alignment: Basic Requirment; Design Criteria; Geometric Design; Radius of horizontal curves; Sight distances
14.3 Road Section: Elements of cross section, typical cross-section for all roads in filling and cutting; Camber; Super-elevation; Gradient
14.4 Use of Nepal Road Standard, 2027(first Revision 2045) and subsequent revision in road design, Nepal Rural Road Standards.
14.5 Drainage System: Importance of drainage system and Requirement for good Drainage system
14.6 Road Pavement StructureM Components: subgrade, sub-base, base and surface courses
14.7 Road Machineries and Technology: Earth moving and compacting machines; Road Construction Technology
14.8 Bridge: T-beam bride; Timber bridges; Culverts
14.9 Road Maintenance: Type schedule of Repair and Maintenance Works
14.10 Tracks and Trails

**15. Airport Engineering (3%)**

15.1 General: Introduction to Air Transport System; Development of Airports; in Nepal: Chassification of Airports: Airport terminologies
15.2 Plannig and Design of Airports: Planning of Airport and its elements; Basic design control and Criteria for design; Geometric design, Structural Design idea
15.3 Components of Airports (General Idea): Terminal Building and Control Tower; Heliport and Hangers; Drainage System

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15.4 Airport Maintenance: Types, Schedule and method of Maintenance

16 स्थानीय निकायसंग सम्बन्धित ऐन, नियम तथा निर्देशिकाहरु (२०%)

16.1 स्थानीय स्वायत्त शासन ऐन, २०५५ तथा नियमावली, २०५६
16.2 सार्वजनिक खरिद ऐन, २०६३
16.3 स्थानीय निकाय (आर्थिक प्रशासन) नियमावली, २०६४
16.4 फोहरमैला व्यवस्थापन ऐन, २०६८ तथा नियमावली, २०७०
16.5 स्थानीय निकाय श्रोत परिचालन तथा व्यवस्थापन निर्देशिका, २०६९
16.6 भवन निर्माण आचार संहिता, २०६८
16.7 भवन ऐन, २०५५
16.8 National Building Code, 2003
16.9 वातावरण संरक्षण ऐन, २०५३ एवं नियमावली २०५४
16.10 भ्रष्टाचार निवारण ऐन, २०५९