

काठमाडौं महानगरपालिका
नेपाल इञ्जिनियरिङ्ग सेवा, सिभिल समूह, अधिकृत छैटौं तह, सिभिल इञ्जिनियर पदको खुला र आन्तरिक
प्रतियोगितात्मक लिखित परीक्षाको पाठ्यक्रम
एवं परीक्षा प्रणाली (योजना)

पाठ्यक्रमको रूपरेखा :- यस पाठ्यक्रमको आधारमा निम्नानुसार दुई चरणमा परीक्षा लिइने छ :

प्रथम चरण :- लिखित परीक्षा पूर्णाङ्क :- २००
द्वितीय चरण :- अन्तर्वार्ता पूर्णाङ्क :- ३०

१. प्रथम चरण: - लिखित परीक्षा योजना (Written Examination Scheme)

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

२. द्वितीय चरण: - अन्तर्वार्ता (Interview)

विषय	पूर्णाङ्क	परीक्षा प्रणाली
अन्तर्वार्ता (Interview)	३०	मौखिक (Oral)

द्रष्टव्य :

- यो पाठ्यक्रम रूपरेखालाई प्रथम चरण (लिखित परीक्षा) र द्वितीय चरण (अन्तर्वार्ता) गरी दुई चरणमा विभाजन गरिएको छ ।
- लिखित परीक्षाको माध्यम भाषा अंग्रेजी वा नेपाली अथवा अंग्रेजी र नेपाली दुवै हुन सक्नेछ ।
- प्रथम र द्वितीय पत्रको विषयवस्तु फरक फरक हुनेछ तथा प्रथम र द्वितीय पत्रको लिखित परीक्षा छुट्टाछुट्टै हुनेछ ।
- प्रथम पत्रका एकाईहरूको प्रश्नसंख्या यथासम्भव निम्नानुसार हुनेछ । द्वितीय पत्रको पाठ्यक्रमका एकाईहरूबाट सोधिने प्रश्नहरूको संख्या द्वितीयपत्रको पाठ्यक्रम उल्लेख भए अनुसार हुनेछ ।

प्रथम पत्रका एकाई	1	2	3	4	5	6	7	8	9
प्रश्न संख्या	20	15	12	12	10	10	8	8	5

- 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 प्रकारको क्याल्कुलेटर (Calculator) प्रयोग गर्न पाइने छैन ।
- विषयगत प्रश्नका लागि तोकिएका १० अङ्कका प्रश्नहरूको 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 टिप्पणीहरू (Short notes) सोध्न सकिने छ ।
- यस पाठ्यक्रम योजना अन्तर्गतका पत्र/विषयका विषयवस्तुमा जेसुकै लेखिएको भए तापनि पाठ्यक्रममा परेका कानून, ऐन, नियम तथा नीतिहरू परीक्षाको मिति भन्दा ३ महिना अगाडि (संशोधन भएका वा संशोधन भई हटाईएका वा थप गरी संशोधन भई) कायम रहेकालाई यस पाठ्यक्रममा परेको सम्झनु पर्दछ ।
- प्रथम चरणको परीक्षाबाट छनौट भएका उम्मेदवारहरूलाई मात्र द्वितीय चरणको परीक्षामा सम्मिलित गराइनेछ ।

१०. पाठ्यक्रम लागू मिति :-

काठमाडौं महानगरपालिका
नेपाल इन्जिनियरिङ सेवा, सिभिल समुह, खुला र आन्तरिक प्रतियोगितात्मकको
छैटौं तह (अधिकृत वा सो सरह) को
लिखित परीक्षाको पाठ्यक्रमको ढाँचा

प्रथम पत्र :- 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
 - 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

काठमाडौं महानगरपालिका
नेपाल इन्जिनियरिङ सेवा, सिभिल समुह, खुला र आन्तरिक प्रतियोगितात्मकको
छठौं तह (अधिकृत वा सो सरह) को
लिखित परीक्षाको पाठ्यक्रमको ढाँचा

द्वितीय पत्र :- जनरल सम्बन्धी विषय

Section A – 30 Marks

- 1. Transportation and Trail Bridge. 30 %**
- 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 – 30 Marks

- 2. Water Supply and Sanitation. 20%**
- 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, separation at source, collection, transportation and disposal of solid wastes.
 - 2.10.4 Sanitary landfill, incineration, composting etc.
 - 2.10.5 Integrated solid waste management.
 - 2.10.7 Solid Waste Management Practices in Kathmandu Valley
- 2.11 Environmental health engineering- Epidemiology, pathogens (Bacteria, Virus, Helminthes, Protozoa)

Section C – 20 Marks

- 3. Energy System 10%**
 - 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. 10%**
 - 4.1 Status of irrigation development in Nepal.
 - 4.2 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%**
 - 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. 10%**

- 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

द्वितीय पत्रको एकाईहरुको प्रश्नसंख्या निम्नानुसार हुनेछ

द्वितीय पत्रका खण्ड	A	B	C	D
द्वितीय पत्रका एकाई	1	2	3	4
प्रश्न संख्या	3	2	3	2