

काठमाण्डौ महानगरपालिका
नेपाल इञ्जिनियरिङ्ग सेवा, अधिकृत छैटौं तह, स्ट्रक्चरल इञ्जिनियर पदको खूला 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	उत्तीर्णाङ्क	परीक्षा प्रणाली	प्रश्न संख्या X अङ्कभार	समय
प्रथम	स्ट्रक्चरल इञ्जिनियरिङ्ग	१००	४०	वस्तुगत बहुउत्तर (Multiple Choice)	१००X१ = १००	१ घण्टा १५ मिनेट
द्वितीय	सम्बन्धी विषय	१००	४०	विषयगत (Subjective)	१०X१० = १००	३ घण्टा

२. द्वितीय चरण :- अन्तर्वार्ता (Interview)

विषय	पूर्णाङ्क	परीक्षा प्रणाली
व्यक्तिगत अन्तर्वार्ता	३०	मौखिक

द्रष्टव्य :

- यो पाठ्यक्रम रूपरेखालाई प्रथम चरण (लिखित परीक्षा) र द्वितीय चरण (अन्तर्वार्ता) गरी दुई चरणमा विभाजन गरिएको छ ।
- लिखित परीक्षाको माध्यम भाषा नेपाली वा अंग्रेजी अथवा नेपाली र अंग्रेजी दुवै हुन सक्नेछ ।
- प्रथम र द्वितीय पत्रको विषयवस्तु एउटै हुनेछ ।
- प्रथम र द्वितीय पत्रको लिखित परीक्षा छट्टाछट्टै हुनेछ ।
- प्रथम र द्वितीय पत्रका एकाइहरूबाट सोधिने प्रश्नहरूको संख्या यथासम्भव निम्नानुसार हुनेछ ।

खण्ड	A					B					
	1	2	3	4	5	6	7	8	9	10	11
प्रथम पत्रका एकाई	1	2	3	4	5	6	7	8	9	10	11
प्रश्न संख्या	14	36	4	4	2	6	10	14	4	2	4
द्वितीय पत्रका एकाई	1	2	3	4	5	6	7	8	9	10	11
प्रश्न संख्या	4					6					

- प्रथम पत्रमा वस्तुगत बहुउत्तर (Multiple Choice) प्रश्नहरूको उत्तर सही दिएमा प्रत्येक सही उत्तर बापत १ (एक) अङ्क प्रदान गरिनेछ भने गलत उत्तर दिएमा प्रत्येक गलत उत्तर बापत २० प्रतिशत अर्थात ०.२ 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 ।
- द्वितीय पत्रका विषयगत प्रश्नको लागि तोकिएको १० अङ्कका प्रश्नहरूको हकमा १० अङ्कको एउटा लामो प्रश्न वा एउटै प्रश्नको 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 ।
- द्वितीय पत्रको पाठ्यक्रमलाई २ वटा खण्ड/एकाईमा विभाजन गरिएको छ, २ वटा खण्ड/एकाईका लागि २ वटा उत्तर पुस्तिका दिइनेछ र परिक्षार्थीले प्रत्येक खण्ड/एकाईका प्रश्नहरूको उत्तर सही खण्ड/एकाईको उत्तर पुस्तिकामा लेख्नु पर्नेछ ।
- यस पाठ्यक्रममा जेसुकै लेखिएको भएता पनि पाठ्यक्रममा परेका ऐन,नियमहरू परीक्षाको मिति भन्दा ३(तीन) महिना अगाडि (संशोधन भएका वा सशोधन भई हटाइएका वा थप गरी सशोधन भई) कायम रहेकालाई यस पाठ्यक्रममा रहेको सम्झनु पर्दछ ।
- प्रथम चरणको लिखित परीक्षाबाट छनौट भएका उम्मेदवारहरूलाई मात्र द्वितीय चरणको अन्तर्वार्तामा सम्मिलित गराइनेछ ।

१२. पाठ्यक्रम लागु मिति :-

Section –A

1. Basic Concept of Civil Engineering

- 1.1 Drawing Techniques : Drawing sheet, Suitable scales, site plans, preliminary drawings, working drawings, perspective, orthographic and axonometric projection; first and third angle projection, symbols.
- 1.2 Engineering Survey : Basic principles of Surveying, Linear measurements techniques, Compass and plane table surveying, Leveling and contouring, Theodolite traversing, Uses of Total Station and Electronic Distance Measuring Instruments.
- 1.3 Estimating and Costing, Valuation and Specification : Types of estimates, Methods of calculating quantities, Norms and rate analysis, methods of valuation, importance of specification.
- 1.4 Engineering Economics : 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.
- 1.5 Construction Materials : Properties of building materials, characteristics and requirements of stones as a building materials, ceramic tiles, Mosaic Tile, brick types and testing, types and properties of lime and cement, Steel; types and properties; Alloys.

2. Structure Analysis and Design

- 2.1 Stresses and strains; theory of torsion and flexure; moment of inertia
- 2.2 Analysis of beams and frames: Bending moment, shear force and deflection of beams and frames.
- 2.3 Determinate structure : Energy methods; three hinged systems.
- 2.4 Indeterminate structures : slope deflection method , moment distribution method, Flexibility matrix, Stiffness matrix.
- 2.5 Use of influence line diagrams for simple beams, unit load method.
- 2.6 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.
- 2.7 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.

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

4. Construction Management

- 4.1 Construction scheduling and planning: network techniques (CPM, PERT) and barcharts
- 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. Professional Practices

- 5.1 Ethics and professionalism: code of conduct and guidelines for professional engineering practices
- 5.2 Nepal Engineering Council Act, 2055 and regulations, 2056
- 5.3 Relation with clients, contractor and fellow professionals
- 5.4 Public procurement practices for works, goods and services and its importance.

Section -B

6. Housing, building and urban planning.

- 6.1 Present status and practices of building construction in Nepal
- 6.2 Specific considerations in design and construction of buildings in Nepal
- 6.3 Indigenous technology in building design and construction
- 6.4 Local and Modern building construction material in Nepal
- 6.5 Community buildings: School and hospital buildings and their design considerations
- 6.6 National Building Code: Hierarchy of building codes and its application, procedure for implementation of building code in Nepal.
- 6.7 Development Control System in municipalities in Nepal
- 6.8 Maintenance and repair of buildings.
- 6.9 Principles of low cost construction techniques.
- 6.10 Current building norms for estimating and costing.
- 6.11 Urban planning needs and challenges in Nepal.

7. Soil Mechanics and Foundation Engineering

- 7.1 Properties of soils : Three phase diagram, Basic definitions of phase relationships, Index properties of soil.
- 7.2 Identification and classification of soils : Field identification of soils, Soil classification; Descriptive, Textural, ISI, MIT and unified.
- 7.3 Permeability of soils : Determination of the coefficient of permeability: laboratory and field methods.
- 7.4 Shear strength of soils : Concept of shear strength, Principal planes and principal stresses, Mohr- Coulomb theory of shear strength, Mohr's stress circle and failure envelop, Types of shear tests.
- 7.5 Stress distribution in soils : State of stress at a point in the subsoil, Stress from elastic

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theories, Boussinesq's theory of stress distribution

- 7.6 Consolidation and settlements: Behaviour of soil under compressive loads, Settlement of structures resting on soil: its nature, causes and remedial measures, Primary and secondary consolidation, Compressibility of soil.
 - 7.7 Stability of slopes: Causes of slope movements and failures, Types of slope and slope failures, Critical surfaces and factor of safety, Method of stability analysis and stability number, Use of Bio engineering in stabilizing slopes
 - 7.8 Site investigation and soil exploration of Building and Bridge sites
 - 7.9 Earth pressure and retaining structures: Rankine's earth pressure theory, Active and passive earth pressure on back fill, Stability analysis of an earth retaining structures
 - 7.10 Bearing capacity of soils: Types of bearing capacity and factors influencing bearing capacity, Effects of various factors on bearing capacity, Modes of foundation failure, Terzaghi's general bearing capacity theory, Ultimate bearing capacity of cohesionless and cohesive soils
 - 7.11 Design of foundation: Design of spread foundation, Design of mat foundation, Pile foundation, Pier foundation, Well foundation, Sheet piles and coffer dams
 - 7.12 Foundation stabilization and underpinning
- 8. Structural Analysis and Design of Building**
- 8.1 Design of RCC footings, columns, slabs, beams..
 - 8.2 Analysis of structural system in a building.
 - 8.3 Design of steel structure.
 - 8.4 Design of timber structure.
 - 8.5 Design of masonry structure.
 - 8.6 Common structural problems in RCC buildings in Nepal.
 - 8.7 Requirements of earthquake resistant building construction.
 - 8.8 Computer Aided Design (CAD) of building structure.
 - 8.9 Mandatory Rule of Thumb in building design.
 - 8.10 Non-engineered earthquake resistant building design.
- 9. Structural Analysis and Design of Bridge and Tunnel**
- 9.1 Introduction to Bridge and Tunneling : Choice of location of bridge site, classification of bridges and components of parts of a bridge, Hydraulic analysis of river, river bank and protection structures, Types of tunnels, component parts of a tunnel and tunnel cross section, survey for tunnel alignment, drainage, lighting and ventilation requirements for tunnels, method of tunneling in firm, soft soils and rock, tunnel lining
 - 9.2 Structural analysis and design of bridge : Various types of bridges, selection of type of bridge and economic span length, types of loads, forces and stresses, live load, impact load, wind load, longitudinal forces, lateral loads, centrifugal force, width of roadway and footway, general design requirements, solid slab bridges, deck girder bridges, B.M. in slab supported on four edges, distribution of live loads on longitudinal beams, method of distribution coefficients, Courbon's method, design of a T- beam bridge, balanced cantilever bridge.
- 10. Analysis and Design of Special Type of Structure**
- 10.1 Design of Overhead Water tank.
 - 10.2 Design of multi-storied building, Shopping complex, business centres.
 - 10.3 Design of grid slab and long columns.
 - 10.4 Design of folded plate, Stadium.

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- 10.5 Design of aqueduct, Syphone, super passage
- 11. Technology, Environment and civil society**
 - 11.1 Technological development in Nepal.
 - 11.2 Promotion of local technology and its adaptation
 - 11.3 Environmental Impact Assessment, Initial Environmental Examination, Global-warming phenomena.
 - 11.4 Types of sources of pollution: point / non-point (for air and water)
 - 11.5 Social mobilization in local infrastructure development and utilization in Nepal.
 - 11.6 Participatory approach in planning, implementation, maintenance and operation of local infrastructure
 - 11.7 Local Self governance act 2055 and regulation 2056.