नेपाल खाद् संस्थान
खुल्ला प्रतिस्पोनजितको पुरूष गर्ने अधिकृत स्तर तह ७ को वरिष्ठ, निर्मित इनजिनियर (प्र.प्र.) पदको
लागि आवश्यक युजनय प्रशिक्षण गर्न र लिखित परीक्षा परीक्षामा प्रवेश दिनेको छ।

(४) आवश्यक युजन शैक्षिक प्रशिक्षण :
मान्यता प्राप्त रिखित विषय संस्थान Civil Engineering विषयमा नर्थक तह उत्तीर्ण गरेको।

(५) प्रावेशमा :
लिखित परीक्षाको माध्यम नेपाली / अंग्रेजी हुनेछ।

प्रणाम-१
लिखित परीक्षा :

<table>
<thead>
<tr>
<th>प्रक्रिया</th>
<th>विषय</th>
<th>पूर्ण छ.</th>
<th>परीक्षाको प्रश्नमा</th>
<th>प्रश्न संक्रम X आधुनिक</th>
<th>उत्तरको पूर्णाङ्क</th>
<th>समय</th>
</tr>
</thead>
<tbody>
<tr>
<td>प्रथम पहिलो</td>
<td>निर्मित इनजिनियरिङ लक्ष्यविषय</td>
<td>100</td>
<td>विभिन्न विषय सह उत्तर (Multiple choice)</td>
<td>100+1=101</td>
<td>३५</td>
<td>२ घण्टा १५ दर्जा</td>
</tr>
<tr>
<td>द्वितीय पहिलो</td>
<td>विभिन्न एक्शन लाइनिंग लक्ष्यविषय</td>
<td>100</td>
<td>विचारविषय (Subjective)</td>
<td>10×10=100</td>
<td>३५</td>
<td>२ घण्टा</td>
</tr>
</tbody>
</table>

प्रणाम-२
अन्तर्भाषा:

सामान्य र समानित विषयवस्तुको ज्ञान ३०
शैक्षिक प्रश्नमा १०
शैक्षिक गौरवमा ३
श्रेणी अंक ३
प्रथम पहिलो २
द्वितीय पहिलो १

१. प्रथम पक्षमा इकाइहरूको प्रश्नसंक्रम निम्नानुसार हुनेछ भने शैक्षिक पक्षमा प्रवेश इकाइहरूको प्रश्नसंक्रम माध्यममा उल्लेख गरिएको छ।

<table>
<thead>
<tr>
<th>प्रथमपक्षमा इकाइ</th>
<th>१</th>
<th>२</th>
<th>३</th>
<th>४</th>
<th>५</th>
<th>६</th>
<th>७</th>
<th>८</th>
<th>९</th>
</tr>
</thead>
<tbody>
<tr>
<td>प्रश्न संक्रम</td>
<td>२०</td>
<td>१५</td>
<td>१२</td>
<td>१०</td>
<td>९</td>
<td>८</td>
<td>७</td>
<td>६</td>
<td>५</td>
</tr>
</tbody>
</table>

२. शैक्षिक पक्षमा विभिन्न प्रश्नहरूको स्वरूप निम्नानुसार हुन सम्भवेछ:
२.१ सामान्य उत्तर हिन्ने १० अंकमा पूरा प्रश्नहरू सोहर लिखिएका छ
२.२ एकै प्रश्नलाई दुई वा दुई बन्दा र बहि भाग (Two or more parts of a single question) विभाजन गरी सीमान लिखिएका छ।
२.३ एकै प्रश्न अत्यन्त दुई वा बहि दिदीयोपकर्त (Short notes) सोहर लिखिएका छ।

३. यस प्रावेशमा जस्तै लिखिएको भाषापनि प्रावेशमा पर्नस भन्ने, निर्देश शैक्षिक परीक्षाको मिति भन्ने ३ (तीन) महिना अगाडि (समापन भन्नाई वा संस्करण भन्नाई हटाइएका वा भन्न गरी संशोधन भन्नाई) कसैले रोजालाई भने प्रावेशमा रोजहरूको समन्त स्थापना रेखाएका हुनेछ।

४. लिखित परीक्षा पहिलो भन्ने उमेद्वारहरूलाई मान अन्तर्भाषा तथा निर्मिति पार्श्वलाई लिखित प्रावेशमा सम्बन्धित मान्यता हुनेछ।
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; Alloy
   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

**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, types and importance of specification
5.6 Purpose, principles and methods of valuation

**Drawing Techniques**

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

**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; 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

**Engineering Economics**

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

**Professional Practices**

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
1. Building Materials and Construction 30%
   1.1 Stone masonry: Types of stone used in stone masonry, specifications of stone masonry.
   1.2 Brick masonry: Classification of bricks, specifications of different types of bricks, testing of bricks, different shapes of bricks.
   1.3 Hollow Concrete Blocks: Various types of concrete blocks, use of concrete blocks in buildings.
   1.4 Sand: Requirement of good quality sand, sieve analysis, fineness modules.
   1.5 Lime: Different types of lime and their uses, test of freshness.
   1.6 Mortar: Types of mortar, specifications, proportion of mortar for various types of masonry works.
   1.7 Paintings: Types of paints, specification for various types of painting works.
   1.8 Water proofing: Water proofing at basement, ground floor and roofs, common water proofing problems in Nepal.
   1.9 Roofing Systems: Different types of roofing system.
   1.10 Doors and windows: Different types of doors and windows, door and window details, merits and demerits of metal door and windows.
   1.11 Walls: Different types of wall system, Load bearing walls, partition walls and curtain walls.
   1.12 Pre-fabrication: Principles of pre-fabrication, advantages and disadvantages of a pre-fabricated building.
   1.13 Flooring: Different types of flooring, specification of floorings.
   1.14 Plastering: Different types of plasters and coating materials.
   1.15 Formworks: Shoring, underpinning, scaffolding and formworks.
   1.16 Building Elements: Foundation, super structure, lintel, floors, roofs, sun control devices, parapet, staircase, emergency stairs, elevators and escalators.
   1.17 Building services: water supply and sanitation, electrification, heating and ventilation and air-conditioning.
   1.19 Development Control System in municipalities in Nepal.
   1.20 Maintenance and repair of buildings.
   1.21 Principles of low cost construction techniques.
   1.22 Current building norms for estimating and costing.

2. Structural Design and Analysis 20%
   2.1 Design of RCC footings, columns, slabs, beams.
   2.2 Analysis of structural system in a building.
   2.3 Design of steel structure.
   2.4 Design of timber structure.
2.5 Design of masonry structure.
2.6 Common structural problems in RCC buildings in Nepal.
2.7 Requirements of earthquake resistant building construction.
2.8 Computer Aided Design (CAD) of building structure.
2.9 Mandatory Rule of Thumb in building design.
2.10 Non-engineered earthquake resistant building design.

3. Housing and Urban Planning 30 %

3.1 Hierarchy of urban settlements,
3.2 Types of urban settlements in Nepal.
3.3 Base Maps:
3.4 Hierarchy of plans
3.5 Principles of land use planning
3.6 Building byelaws
3.7 Periodic plans for local authorities
3.8 Planning legislation of Nepal
3.9 Environmental issues in urban development.
3.10 Institutions involved in urban planning and development in Nepal.
3.11 Types of urban development programmes in Nepal.
3.12 Conservation of heritage sites,
3.13 Settlement planning for disaster mitigation.
3.14 Municipalities of Nepal and their role in urban development.
3.15 Town Development Committees and their role in urban development.
3.16 Different types of housing,
3.17 Principles of housing design,
3.18 Different models of land development,
3.19 Squatter and slums,
3.20 Private housing development,
3.21 Rural housing, housing development programmes in Nepal,
3.22 Prospects of apartments and group housing in Nepal.

4. Architecture 20% 

4.1 History of architecture
4.2 Contemporary world architecture
4.3 Contemporary Nepalese architecture
4.4 Traditional architecture of Nepal
4.5 Architecture of Kathmandu Valley
4.6 Principles of architectural design.
4.7 Factors to be considered while designing buildings.
4.8 Standards to be followed while designing buildings in Nepal
4.9 Contemporary world architects and their works
4.10 Architectural landmarks in Nepal
4.11 Conservation of historic buildings.
4.12 Ethics of architects in professional practice.