

नेपाल इन्जिनियरिङ सेवा, सिभिल समूह, एयरपोर्ट, विन्डिङ एण्ड आर्किटेक्ट, जनरल, हाइवे, हाइड्रोपावर, इरिगेशन र स्यानिटरी उपसमूहको राजपत्राङ्कित तृतीय श्रेणीका पदहरूको खुला र आन्तरिक प्रतियोगितात्मक लिखित परीक्षाको पाठ्यक्रम

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

प्रथम चरण :- लिखित परीक्षा पूर्णाङ्क :- २००

द्वितीय चरण :- अन्तर्वाता पूर्णाङ्क :- ३०

प्रथम चरण - लिखित परीक्षा योजना (Examination Scheme)

पत्र	विषय	पूर्णाङ्क	उत्तीर्णाङ्क	परीक्षा प्रणाली	प्रश्न संख्या X अङ्कभार	समय
प्रथम	सिभिल इन्जिनियरिङ सम्बन्धी विषय	१००	४०	बस्तुगत बहुउत्तर (Multiple Choice)	$१०० \times १ = १००$ $४० \times २ = ८०$	१ घण्टा १५ मिनेट
द्वितीय	उपसमूह सम्बन्धी विषय	१००	४०	विषयगत (Subjective)	$१० \times १० = १००$	३ घण्टा

द्वितीय चरण

विषय	पूर्णाङ्क	परीक्षा प्रणाली
व्यक्तिगत अन्तर्वाता	३०	मौखिक

- लिखित परीक्षाको माध्यम भाषा नेपाली वा अंग्रेजी अथवा नेपाली र अंग्रेजी दुवै हुन सक्नेछ।
- पाठ्यक्रमको प्रथम र द्वितीय पत्रको विषयवस्तु फरक फरक हुनेछन्।
- माथि उल्लिखित उपसमूहको पाठ्यक्रमको प्रथमपत्रको विषयवस्तु एउटै हुनेछ। द्वितीयपत्रको विषयवस्तु उपसमूह अनुसार फरक फरक हुनेछन्।
- प्रथम र द्वितीय पत्रको लिखित परीक्षा छुट्टाछुट्टै हुनेछ।
- प्रथम पत्रको पाठ्यक्रमको एकाईहरूबाट सोधिने प्रश्नहरूको संख्या निम्नानुसार हुनेछ। द्वितीय पत्रको पाठ्यक्रमको एकाईहरूबाट सोधिने प्रश्नहरूको संख्या द्वितीयपत्रको पाठ्यक्रम उल्लेख भए अनुसार हुनेछ।

प्रथमपत्रको एकाई	१	२	३	४	५	६	७	८	९
प्रश्न संख्या	२०	१५	१२	१२	१०	१०	८	८	५

- प्रथम पत्रमा बस्तुगत बहुउत्तर (Multiple Choice) प्रश्नहरूको उत्तर सही दिएमा प्रत्येक सही उत्तर वापत १ एक अङ्क प्रदान गरिनेछ भने गलत उत्तर दिएमा प्रत्येक गलत उत्तर वापत २० प्रतिशत अर्थात् ०.२ अङ्क कट्टा गरिनेछ। तर उत्तर नदिएमा त्यस वापत अङ्क दिइने छैन र अङ्क कट्टा पनि गरिने छैन।
- द्वितीय पत्रको विषयगत प्रश्नका लागि तोकिएका १० अङ्कका प्रश्नहरूको हकमा १० अङ्कको एउटा वा सो प्रश्न वा एउटा 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।
- द्वितीय पत्रको पाठ्यक्रमलाई ४ वटा खण्ड/एकाईमा विभाजन गरिएको छ, ४ वटा खण्ड/एकाईका लागि ४ वटै उत्तर पुस्तिका दिइनेछ र परिक्षार्थीले प्रत्येक खण्ड/एकाईका प्रश्नहरूको उत्तर सही खण्ड/एकाईको उत्तर पुस्तिकामा लेख्नु पर्नेछ।
- यस पाठ्यक्रममा जसुकै लेखिएको भएता पनि पाठ्यक्रममा परेका एन, नियमहरू परीक्षाको मिति भन्दा ३ (तीन) महिना अगाडि सशोधन भएका वा सशोधन भई हटाइएका वा थप गरी सशोधन भई कायम रहेकालाई यस पाठ्यक्रममा रहेको सम्झनु पर्नेछ।
- प्रथम चरणको लिखित परीक्षाबाट छनौट भएका उम्मेदवारहरूलाई मात्र द्वितीय चरणको अन्तर्वातामा सम्मिलित गराइनेछ।
- यस भन्दा अगाडि लागू भएको माथि उल्लिखित समूहको पाठ्यक्रम खारेज गरिएको छ।
- पाठ्यक्रम लागू मिति :- २०६२/२/१७ देखि

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प्रथम पत्र :- सिभिल इन्जिनियरिङ 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

# पदशर्ति शक्ति

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- 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

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बस्तुगत बहुउत्तर नमूना प्रश्नहरू (Sample questions)

1. The most reliable estimate is  
 (A) Detailed estimate  
 (B) Preliminary estimate  
 (C) Plinth area estimate  
 (D) Cube rate estimate  
**Correct Answer:- (A)**
2. The first stage of construction project is  
 (A) Preparation of estimate  
 (B) Survey of the site  
 (C) Preparation of tender  
 (D) Initiation of planning  
**Correct Answer:- (D)**
3. Slump test of concrete is a measure of its  
 (A) Consistency  
 (B) Compressive strength  
 (C) Tensile strength  
 (D) Impact value  
**Correct Answer:- (A)**
4. Internal rate of return (IRR) is one of the indicators of an investment project and is used for the selection of it. The project is financially acceptable  
 (A) If the IRR is greater than the borrowing rate  
 (B) If the IRR is less than the borrowing rate  
 (C) If the IRR is equal to the borrowing rate  
 (D) Without calculating the IRR  
**Correct Answer:- (A)**
5. The back staff reading on a Bench Mark (B.M.) of reduced level 500.00m is 2.685m. If foresight reading on a point is 1.345m the reduced level of the point is  
 (A) 502.685m  
 (B) 501.345m  
 (C) 501.340m  
 (D) 504.030m  
**Correct Answer:- (C)**
6. An under reinforced section means  
 (A) Steel is provided at the under side only  
 (B) Steel provided is insufficiently  
 (C) Steel is provided on one face only  
 (D) Steel will yield First  
**Correct Answer:- (D)**
7. Nepal Engineering Council is an autonomous body formed under NEC act.....  
 (A) 2053  
 (B) 2054  
 (C) 2055  
 (D) 2056  
**Correct Answer:- (C)**
8. The strength of a stone depends on  
 (A) Chemical composition  
 (B) Degree of packing of constituents  
 (C) Structure of rock  
 (D) All of the above  
**Correct Answer:- (D)**
9. Lacing in steel structures are provided  
 (A) to reduce the slenderness ratio of a long strut  
 (B) for connecting together two or more sections  
 (C) through out the length of strut as far as practicable  
 (D) all of the above  
**Correct Answer:- (D)**

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खुला र आन्तरिक प्रतियोगितात्मक लिखित परीक्षाको पाठ्यक्रम  
द्वितीय पत्र :- बिल्डिङ एण्ड आर्किटेक्ट सम्बन्धी विषय

**Section A- 30 Marks**

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 modulus.
  - 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.
  - 1.18 National Building Code: Hierarchy of building codes and its application, procedure for implementation of building code in Nepal.
  - 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.

**Section B- 20 Marks**

- 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.

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**Section C- 30 Marks**

**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.

**Section D- 20 Marks**

**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.

द्वितीय पत्रको एकाईहरूको प्रश्नसंख्या निम्नानुसार हुनेछ

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

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1. Mention the different types of the stone walls that are used in a building. Describe their suitability in foundation and superstructure.
2. Describe the different bonds that are used in brick walls. Write their usefulness compared to hollow concrete blocks.
3. Write about the qualities of good sand used for building. Discuss the usefulness of the lime and cement sand mortar.
4. A modern building has to be painted in different colors. Describe which paints will you use in the exterior and the interior. Write about the ways of using the paint in the exterior wall.
5. What are the effects of dampness in buildings? Write how the damp proofing of a basement is carried out.
6. Differentiate between the panelled and the flush doors. Draw a section through a window having openable and fixed shutters.
7. Differentiate between a single, double and triple roofs. A room 4.5 meter wide has to be constructed using timber roof. Draw a sketch of its plan, elevation and section giving the dimensions of all the members.
8. What are the requirements of a good floor? Draw a sketch of a solid ground floor using concrete for a residence.
9. What do you understand by temporary constructions? Differentiate between shoring and underpinning. Draw a sketch of a building wall being underpinned with shoring provided to it.
10. What are the different elements of a building? Draw a wall section right from the foundation to the roof of a building. Give the names and the dimensions of all the elements such as foundation, lintel, etc.