

नेपाली सेना

प्रा.उ.से. सिभिल ईन्जिनियर (खुला) पदको लिखित परीक्षाको पाठ्यक्रम

समय : २ घण्टा ३० मिनेट

पुर्णाङ्क : १००

उत्तीर्णाङ्क : ४०

यो पाठ्यक्रम नेपाली सेनाको विभिन्न ईकाईहरूमा रिक्त रहेको प्रा.उ.से.सिभिल ईन्जिनियर (खुला) पदका उम्मेदवार छनौट परीक्षाको लागि निर्धारण गरिएको हो । लिखित परीक्षामा सरिक हुने उम्मेदवारहरूको पेशा सम्बन्धि विषयलाई आधारमानी प्रश्नहरू सोधिने छ ।

- (क) लिखित परीक्षाको माध्यम नेपाली/अंग्रेजी वा दुवै भाषा हुनेछ ।
- (ख) लिखित परीक्षाबाट छनौट भएका उम्मेदवारहरूलाई मात्र अर्को चरणको परीक्षामा सम्मिलित गराईने छ ।
- (ग) प्रश्न पत्र निर्माण गर्दा पाठ्यक्रममा समावेश भएका सबै विषयहरूलाई समेटिनेछ ।
- (घ) नेपाली सेनाको आवश्यकता तथा विविध परिस्थितमा नेपाली सेना अनुकूल हुने गरी उल्लेखित विवरणहरूमा हेरफेर हुन सक्नेछ ।
- (ङ) पाठ्यक्रमको रूपरेखा देहायमा उल्लेख गरे अनुसार हुनेछ ।
- (च) पाठ्यक्रम लागु मिति २०७३/१/७ गते ।

विषय	पुर्णाङ्क	उत्तीर्णाङ्क	परीक्षा प्रणाली		प्रश्न संख्या X अङ्क	समय
पेशा सम्बन्धी	१००	४०	वस्तुगत (Objective)	बहुवैकल्पिक प्रश्न (MCQs)	४० प्रश्न X १ अङ्क = ४०	२ घण्टा ३० मिनेट
			विषयगत (Subjective)	छोटो उत्तर	६ प्रश्न X ५ अङ्क = ३०	
				लामो उत्तर	३ प्रश्न X १० अङ्क = ३०	

पेशा सम्बन्धी विषयको पाठ्यक्रम
(SYLLABUS FOR CIVIL ENGINEER)

1. Structural Analysis and Design

- 1.1 Stress and strain; 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 structure: 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 bases, Design principles on timber beams and columns

2. Construction Materials

- 2.1 Properties of building materials: physical, chemical, constituents, thermal, etc.
- 2.2 Stones – characteristics and requirements of stones as a binding materials
- 2.3 Ceramic materials: ceramic tiles, mosaic tile, brick types and testing
- 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

- 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 Admixtures
- 3.5 High strength concrete
- 3.6 Pre-stressed concrete technology

4. Construction Management

- 4.1 Construction scheduling and planning: networks techniques(CPM,PERT) and bar charts
- 4.2 Contractual procedure and management: types of contract, tender and tender notice, preparation of binding (tender) document, contractors pre-qualification, evaluation of tenders and selection of contractor, contract acceptance, condition of contract; quotation and direct order ,classification 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

- 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

- 6.1 Drawing sheet composition and its essential components
- 6.2 Suitable scales, site plans, preliminary drawings, working drawings
- 6.3 Theory of projection drawing: perspective, orthographic and axonometric projection; first and third angle projection
- 6.4 Drawing tools and equipments
- 6.5 Drafting conventions and symbols
- 6.6 Topographic, electric, plumbing and structural drawings
- 6.7 Techniques of free hand drawing

7. Engineering Survey

- 7.1 Introduction and basic principles
- 7.2 Linear measurements: techniques; chain, tape, ranging rods and arrows; representation of measurements 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; method of contouring
- 7.5 Theodolite traversing :need of traverse and its significance; computation of coordinates; adjustment of closed traverse ;closing errors
- 7.6 Use of Total Station and Electronic Distance Measuring Instruments

8. 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

9. Engineering 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

10. Transportation and Trail Bridge

- 10.1 Transportation system and its classification
- 10.2 Transportation planning: rationale, types and its philosophy
- 10.3 Road transport and road construction in Nepal
- 10.4 Classification of roads in Nepal (NRS and IRC)
- 10.5 General principles of road network planning
- 10.6 Feasibility study of road projects
- 10.7 Alignment, engineering survey and its stages
- 10.8 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
- 10.9 Drainage consideration in roads
 - 10.9.1 Introduction and design of culverts and minor bridges, cross drainage structures, subsurface drainage system
- 10.10 Special consideration in hill roads design
 - 10.10.1 Problems associated with hill roads construction
 - 10.10.2 Route location, hairpin bends and special structures
- 10.11 Road pavements: types of pavement and their applicability in hill roads, design of pavement
- 10.12 Bio engineering practices along hill side
- 10.13 Activities and techniques in road construction in rural roads
- 10.14 Maintenance, repair and rehabilitation of roads
- 10.15 Basic knowledge on design, construction and maintenance of suspended and suspension bridge in Nepal
- 10.16 Role of social mobilization in rural road development
- 10.17 Low-cost road construction

11. Water Supply and Sanitation

- 11.1 Rural and community based water supply system
- 11.2 Water supply sources and their management : surface and ground water
- 11.3 Selection of source
- 11.4 Water quantity and treatment, water demand and supply, source protection
- 11.5 Intakes, collection chamber and break pressure tanks
- 11.6 Reservoir and distribution system
- 11.7 Intakes, pipeline design, design of transmission and distribution system, reservoir design
- 11.8 Pipe and fittings: pipe materials, pipe laying and fittings
- 11.9 Operation and maintenance of water supply systems
- 11.10 Sanitation, wastewater and solid waste management:
 - 11.10.1 On-site sanitation system
 - 11.10.2 Types of sewerage system, design and construction of sewers
 - 11.10.3 Types, characteristics, sources, quantity, generation, collection, transportation and disposal of solid wastes
- 11.11 Sanitary landfill, incineration, composting, etc.
- 11.12 Environment health engineering – epidemiology, pathogens (bacteria, virus, helminthes, protozoa)

12. Energy System

- 12.1 Hydrological study, planning and design of small, medium and large hydropower projects
- 12.2 Stages of hydropower development: Reconnaissance, Pre-feasibility, feasibility studies and detailed engineering design
- 12.3 Head works and design of ROR, PROR and storage type hydropower power plant
- 12.4 Methods of fixing installed capacity of a hydropower plant
- 12.5 Estimation of power and energy
- 12.6 Intake, settling basin, forebay, penstock and its basic design
- 12.7 Head works, dams, spillways, surge tanks, stilling basin and its basic design
- 12.8 Selection of turbine
- 12.9 Generators and their types
- 12.10 Purpose and working principle of Governors
- 12.11 Sediment concentration in hydropower project and its impact
- 12.12 River diversion works
- 12.13 Biogas-Introduction
- 12.14 Alternative energy systems in Nepal

13. Irrigation and River Training Works

- 13.1 Status of irrigation development in Nepal
- 13.2 Methods of irrigation and their suitability
- 13.3 Design of irrigation canals
- 13.4 Operation and maintenance of irrigation systems
- 13.5 Management of farmers managed irrigation system
- 13.6 Preventive and remedial measures of water logging
- 13.7 Flood control, its necessity and flood mitigation measures
- 13.8 River training works
- 13.9 Specific considerations in design, operation and management of hill irrigation systems

14. Housing, Building and Urban Planning

- 14.1 Present status and practices of building construction in Nepal
- 14.2 Specific considerations in design and construction of buildings in Nepal
- 14.3 Indigenous technology in building design and construction
- 14.4 Local and modern building construction material in Nepal
- 14.5 Community buildings: school and hospital buildings and their design considerations
- 14.6 Urban planning needs and challenges in Nepal

15. Technology, Environment and Civil Society

- 15.1 Technological development in Nepal
- 15.2 Promotion of local technology and its adaptation
- 15.3 Environmental Impact Assessment (EIA), Initial Environmental Examination (IEE), Global warming phenomena
- 15.4 Types of sources of pollution: point/non-point (for air and water)
- 15.5 Social mobilization in local infrastructure development and utilization in Nepal
- 15.6 Participatory approach in planning, implementation, maintenance and operation of local infrastructure

यस पेशा सम्बन्धी विषयको पाठ्यक्रमका एकाईहरूबाट सोधिने प्रश्नहरूको संख्या निम्नानुसार हुनेछ ।

एकाई नं. (Unit No.)	अङ्कभार (Weightage)	बहुवैकल्पिक प्रश्न (MCQs) को संख्या	छोटो उत्तर प्रश्नको संख्या	लामो उत्तर प्रश्नको संख्या
१	२५	१०	६ प्रश्न X ५ अङ्क	३ प्रश्न X १० अङ्क
२				
३				
४	२५	१०		
५				
६				
७	२५	१०		
८				
९				
१०	२५	१०		
११				
१२				
१३	२५	१०		
१४				
१५				
जम्मा	१००	४० प्रश्न X १ अङ्क = ४० अङ्क	६ प्रश्न X ५ अङ्क = ३० अङ्क	३ प्रश्न X १० अङ्क = ३० अङ्क

Multiple Choice 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 1.345 m 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 underside only
 - (b) Steel provided is insufficiently
 - (c) Steel is provided on one face only
 - (d) Steel will yield first**Correct Answer: - (d)**

Sample (Long and Short Questions)

1. What are the design and construction problems of hill roads? What special considerations need to be done in the selection of alignment for roads in high altitude mountainous region?
2. What differences between suspension and suspended trial bridge. Explain briefly the factors influencing the cable tension in design of a cable?
3. Determine the storage capacity of a reservoir for a daily requirement of 2,25,000 litres. The pumping rate is 8 hrs (8AM to 4 PM) constantly. The draw-off is as follows:
7AM-8AM=30% of daily supply.
8AM-5PM=35% of daily supply.
5PM-6.30PM=30% of daily supply.
6.30PM-7AM=5% of daily supply.
4. Write short notes on the farmers managed irrigation systems
5. Briefly explain Indigenous technology in building designs.
6. Calculate the Hydropower potential of a river having average discharge of 10 cusecs for an available head of 10 m. The efficiency of turbine is estimated to be 90 percent.