प्राविधिक शिक्षा तथा व्यावसायिक तालीम परिषद्

पदपूर्ति समिति

सानोठिमी, भक्तपुर ।

प्राविधिक तथा प्रशिक्षण सेवा, इन्जिनियरिङ्ग समूह, सिभिल/स्यानिटेशन/प्लम्बिङ्ग उपसमूह अधिकृतस्तर तृतीय श्रेणी **निर्माण/स्यानिटरी/प्लम्बिङ्ग प्रशिक्षक पदको**

खुला र आन्तरिक प्रतियोगितात्मक लिखित परीक्षाको पाठ्यक्रम

सेवा : प्राविधिक तथा प्रशिक्षण	समूह : इन्जिनियरिङ्ग
उपसमूह : सिभिल /स्यानिटरी/प्लम्बिङ्ग	पद : निर्माण/स्यानिटरी/प्लम्बिङ्ग प्रशिक्षक
स्तर : अधिकृतस्तर तृतीय श्रेणी	किसिम : खुला/आ.प्र.

पाठ्यक्रमको रूपरेखा : यस पाठ्यक्रमको आधारमा निम्नानुसार दुई चरणमा परीक्षा लिइनेछ ।

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

परीक्षा योजना (Examination Scheme)

१.प्रथम चरण: – लिखित परीक्षा पूर्णाङ्क :– २००

पत्र	विषय	पूर्णाङ्क	उतीर्णाङ्क	परीक्षा प्रणाली	प्रश्नसंख्याxअङ्क	समय
प्रथम	सामान्य ज्ञान, संस्थागत ज्ञान र सेवा सम्बन्धी	100	40	वस्तुगत - बहुवैकल्पिक प्रश्न (MCQ)	१०० प्रश्न x १ अङ्क	१ घण्टा १५ मिनेट
द्वितीय	सेवा सम्बन्धी	100	40	विषयगत- छोटो उत्तर आउने प्रश्न	८ प्रश्न x ५अङ्क	३ घण्टा
				विषयगत- लामो उत्तर आउने प्रश्न	६ प्रश्न x १०अङ्क	

२. द्वितीय चरण : – अन्तर्वार्ता पूर्णाङ्क :– ३०

विषय	पूर्णाङ्क	परीक्षा प्रणाली
अन्तर्वार्ता	30	मौखिक

द्रष्टव्य :

1. लिखित परीक्षाको माध्यम भाषा नेपाली वा अंग्रेजी अथवा नेपाली र अंग्रेजी दुवै हुनेछ ।
2. प्रथम र द्वितीय पत्रको लिखित परीक्षा छुट्टाछुट्टै हुनेछ ।
3. वस्तुगत बहुवैकल्पिक (Multiple Choice) प्रश्नको 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 ।
4. वस्तुगत बहुवैकल्पिक हुने परीक्षामा परीक्षार्थीले उत्तर लेख्दा अंग्रेजी ठूलो अक्षर (Capital letter) A,B,C,D मा लेख्नुपर्नेछ । सानो अक्षर (Small letter) a,b,c,d लेखेको वा अन्य कुनै सङ्केत गरेको भए सबै उत्तरपुस्तिका रद्द हुनेछ ।
5. बहुवैकल्पिक प्रश्न हुने परीक्षामा कुनै प्रकारको क्याल्कुलेटर (Calculator) प्रयोग गर्न पाइने छैन ।
6. परीक्षामा सोधिने प्रश्नसंख्या, अङ्क र अङ्कभार सम्बन्धित पत्र /विषयमा तोकिए अनुसार हुनेछ ।
7. विषयगत प्रश्न हुने पत्रका हकमा प्रत्येक खण्डका लागि छुट्टाछुट्टै उत्तरपुस्तिकाहरू हुनेछन् । उम्मेदवारले प्रत्येक खण्डका प्रश्नहरूको उत्तर सोही खण्डको उत्तरपुस्तिकामा लेख्नुपर्ने छ ।
8. 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 पाठ्क्रममा परेको सम्झनु पर्दछ ।
9. प्रथम चरणको परीक्षाबाट छनोट भएका उम्मेदवारलाई मात्र द्वितीय चरणको परीक्षामा सम्मिलित गराइनेछ ।
10. **पाठ्यक्रम लागू मिति :– २०८२।१०।२२**

प्राविधिक शिक्षा तथा व्यावसायिक तालीम परिषद्

पदपूर्ति समिति

सानोठिमी, भक्तपुर ।

प्राविधिक तथा प्रशिक्षण सेवा, इन्जिनियरिङ्ग समूह, सिभिल/स्यानिटेशन/प्लम्बिङ्ग उपसमूह अधिकृतस्तर तृतीय श्रेणी **निर्माण/स्यानिटरी/प्लम्बिङ्ग प्रशिक्षक पदको**

खुला र आन्तरिक प्रतियोगितात्मक लिखित परीक्षाको पाठ्यक्रम

प्रथम पत्र :

प्रथम पत्र : सामान्य ज्ञान, संस्थागत ज्ञान र सेवा सम्बन्धी

वस्तुगत (१०० प्रश्न X १ अङ्क)

खण्ड (क) - (२० अङ्क)

1. **सामान्य ज्ञान** (२० प्रश्न X १ अङ्क)
   - 1.1 विश्वका प्रमुख ऐतिहासिक घटनाहरू
   - 1.2 नेपालको इतिहास
   - 1.3 नेपालको भूगोल
   - 1.4 नेपालको संवैधानिक विकासक्रम र नेपालको संविधान
   - 1.5 नेपालको आर्थिक, राजनीतिक, सामाजिक र सांस्कृतिक व्यवस्था
   - 1.6 आवधिक योजना सम्बन्धी जानकारी
   - 1.7 नेपालका प्रचलित धर्म, संस्कृति, जात जाति, भाषा, साहित्य र कला
   - 1.8 खेलकूद तथा मनोरन्जन सम्बन्धी विविध जानकारी
   - 1.9 विज्ञान र प्रविधि, प्रसिद्ध वैज्ञानिक र तिनको योगदान
   - 1.10 दिगो विकासका लक्ष्यहरू, वातावरण तथा जलवायु परिवर्तन
   - 1.11 अन्तर्राष्ट्रिय संघ संस्था (संयुक्त राष्ट्संघ, इयू, आसियान, बिमष्टेक र सार्क)
   - 1.12 नेपालको वैदेशिक सम्बन्ध र परराष्ट्र नीति
   - 1.13 राष्ट्रिय र अन्तर्राष्ट्रिय महत्वका समसामयिक घट्ना तथा नविनतम गतिविधिहरू

खण्ड (ख) - (२० अङ्क)

2. **संस्थागत ज्ञान र सेवासँग सम्बद्ध कानून** (२० प्रश्न X १ अङ्क)
   - 2.1 प्राविधिक शिक्षा तथा व्यावसायिक तालीमको पृष्ठभूमि, लक्ष्य र उद्देश्य
   - 2.2 राष्ट्रिय शिक्षा नीति, २०७६
   - 2.3 तालीम नीति, २०७१
   - 2.4 प्राविधिक शिक्षा तथा व्यावसायिक तालीम परिषद् ऐन, २०४५ र नियमावली, २०५१
   - 2.5 प्राविधिक शिक्षा तथा व्यावसायिक तालीम परिषद्, परीक्षा सम्बन्धी विनियमावली, २०७१
   - 2.6 प्राविधिक शिक्षा तथा व्यावसायिक तालीम परिषद्, कर्मचारी सेवा, शर्त तथा सुविधा सम्वन्धी विनियमावली, २०६९
   - 2.7 प्राविधिक शिक्षा तथा व्यावसायिक तालीम परिषद्, आर्थिक प्रशासन सम्वन्धी विनियमावली, २०६२
   - 2.8 स्थानीय सरकार संचालन ऐन, २०७४
   - 2.9 सुशासन (संचालन तथा व्यवस्थापन) ऐन, २०६४
   - 2.10 भ्रष्टाचार निवारण ऐन, २०५९

खण्ड (ग) - (६० अङ्क)

3. **सेवा सम्बन्धी विषय** (६० प्रश्न X १ अङ्क)

   द्वितीय पत्रको सेवा सम्बन्धी विषयको पाठ्यक्रम नै प्रथम पत्रको खण्ड "ग" को सेवा सम्बन्धी विषयको पाठ्यक्रम हुनेछ ।

प्राविधिक शिक्षा तथा व्यावसायिक तालीम परिषद्

पदपूर्ति समिति

सानोठिमी, भक्तपुर ।

प्राविधिक तथा प्रशिक्षण सेवा, इन्जिनियरिङ्ग समूह, सिभिल/स्यानिटेशन/प्लम्बिङ्ग उपसमूह अधिकृतस्तर तृतीय श्रेणी **निर्माण/स्यानिटरी/प्लम्बिङ्ग प्रशिक्षक पदको**

खुला र आन्तरिक प्रतियोगितात्मक लिखित परीक्षाको पाठ्यक्रम

द्वितीय पत्र - सेवा सम्बन्धी

खण्ड (क) - (५० % अङ्क)

(४ प्रश्न × ५ अङ्क र ३ प्रश्न ×१० अङ्क)

1. **Construction Materials**
   - 1.1 Properties of building materials: physical, chemical, thermal
   - 1.2 Stones: characteristics and requirements of stones as a building materials
   - 1.3 Ceramic materials: ceramic tiles, mosaic tiles, brick classes and testing
   - 1.4 Cementing materials: types and properties of lime and cement, manufacturing process, cement mortar and different tests
   - 1.5 Metals : steels, types and properties, alloys
   - 1.6 Timber and wood : timber trees in Nepal, hard and soft wood, characteristics of good timber, seasoning, preservation of timber, plywood, batten board
   - 1.7 Miscellaneous materials : asphalt, bitumen, paint and varnishes, glass, polymers

2. **Drawing Techniques**
   - 2.1 Drawing sheet composition and its essential components
   - 2.2 Suitable scales, site plans, preliminary drawings, working drawings etc
   - 2.3 Theory of projection drawings: perspective, orthographic and axonometric projection, first and third angle projection
   - 2.4 Drafting tools and equipments
   - 2.5 Drafting Symbols
   - 2.6 Topographic, electrical, plumbing and structural drawings
   - 2.7 Technique of free hand drawing

3. **Engineering Survey**
   - 3.1 Introduction and basic principles, linear measurement, chain survey, compass survey, plane table survey, leveling and contouring, abney level survey, theodolite traversing, tachometry survey, trigonometric leveling, hydrographic survey
   - 3.2 Use of total station and electronic distance measuring instruments

4. **Concrete Technology**
   - 4.1 Constituents and properties of concrete, water cement ratio, grade and strength of concrete, concrete mix design, testing of concrete
   - 4.2 Mixing, transportation, pouring and curing of concrete
   - 4.3 Admixtures
   - 4.4 High strength concrete
   - 4.5 Pre-stressed concrete technology

5. **Building Construction, Housing and Urban planning**
   - 5.1 Load bearing and framed structures, foundation types and its design
   - 5.2 Types of walls, types of roofs, types of doors and windows, types of stairs and design of dog legged stairs
   - 5.3 Damp proofing methods, plastering and pointing

5.4 Shoring, scaffolding, under pining, timbering of trenches, formworks
5.5 Present status and practices of building construction in Nepal
5.6 Specific consideration in design and construction of buildings in Nepal
5.7 Community buildings: schools and hospital buildings and their design considerations
5.8 Local and modern building construction materials in Nepal
5.9 Urban planning need and challenges in Nepal

6. **Fluid Mechanics and Hydraulic**
6.1 Properties of fluid, hydrostatics forces on plane and curved surfaces, buoyancy
6.2 Types of flow, continuity equation, Bernoulli equation and its application, momentum equation, flow in curved path
6.3 Uniform and non uniform flow in channels
6.4 Specific energy and momentum principle and application
6.5 Analysis of pipe flow, pipelines and pipe systems
6.6 Pipe networks and their analyses, water hammer phenomenon

7. **Soil Mechanics and Highway engineering**
7.1 Phase diagrams, physical properties of soils and soil classification tests, classification of soils, permeability of soil, compaction and consolidation of soil, shearing characteristics of soil, bearing capacity of soils, earth pressure, stability of slopes
7.2 Transportation system and its classification
7.3 Road transport in Nepal
7.4 Classification of roads in Nepal
7.5 Feasibility study of road projects
7.6 Road alignment and engineering survey
7.7 Highway geometric design
7.8 Hill roads (problems associated with hill road construction, route location, hairpin bends, special structures)
7.9 Types of road pavements and their applicability, construction procedure of different types of roads
7.10 Bioengineering practices in hillside stabilization
7.11 Activities and techniques in rural road construction
7.12 Maintenance of roads
7.13 Basic knowledge on design, construction and maintenance of suspended and suspension bridge in Nepal (Based on TBSSP Manual)

खण्ड (ख) - (५० % अङ्क)
(४ प्रश्न × ५ अङ्क र ३ प्रश्न ×१० अङ्क)

8. **Structure Analysis and Design**
8.1 Stress and strains, theory of tension and flexure, moment of inertia, centre of gravity
8.2 Analysis of beams and frames: bending moment, shear force, deflection of beams and frames, determinate structure- energy methods, three hinged system, indeterminate structures - slope and deflection method and moment distribution method, use of influence line diagrams for simple beams, unit load method
8.3 RCC structures: difference between working stress and limit state methods, analysis of RC beams, slabs in bending, shear, deflection, bond and end

anchorage, design of axially loaded columns, isolated and combined footings, pre stressed concrete

8.4 Steel and timber structures: standard and built up sections, design of riveted, bolted and welded connections, design of simple elements (ties, strut, axially loaded and eccentric columns, column base), design principles of timber beams and columns

9. **Water Supply and Sanitary Engineering**

9.1 Rural and community based water supply system

9.2 Selection of source, computation of water demand

9.3 Water quality and treatment, water demand and supply, source protection

9.4 Design of intakes, break pressure tank, collection chamber etc

9.5 General knowledge about reservoir and distribution system

9.6 Pipe line design, design of transmission and distribution system, reservoir design

9.7 Pipe and fittings: pipe materials, pipe laying and fittings

9.8 Various aspects of operation and maintenance of water supply systems

9.9 Sanitation, waste water and solid waste management : on site sanitation system, types of sewerage system, design and construction of sewers; types, characteristics, sources, quantity, generation, collection, transportation and disposal of solid wastes

9.10 General knowledge about sanitary landfill, incineration, composting etc

9.11 Environmental health engineering: epidemiology, pathogens (bacteria, virus, helminthes, protozoa)

10. **Irrigation Engineering**

10.1 Status of irrigation development in Nepal

10.2 Methods of irrigation, computation of water requirements for crops, duty delta and canal losses

10.3 Design of irrigation canals

10.4 Various aspects of operation and maintenance of irrigation systems

10.5 Water logging: preventive and remedial measures

10.6 Design of various river training and slope protection works

10.7 Specific consideration in design, operation and management of hill irrigation systems

11. **Hydrology and Hydropower Engineering**

11.1 Hydrological cycle and water balance

11.2 Precipitation and losses

11.3 Surface runoff and hydrological analysis

11.4 Flood frequency analysis

11.5 Hydropower development in nepal

11.6 Hydrological study, planning and design of small hydropower projects

11.7 Types of dams and their properties

11.8 Design of head works, dam, spillways, surge tanks, stilling basin etc

11.9 Design of water conveyance structures

11.10 Power house and hydro electric equipments

12. **Estimating, Costing and Valuation**

12.1 Types of estimate and their specific uses

12.2 Methods of calculating quantities
12.3 Estimate of building works, road earthwork, canal earthwork, retaining walls, sanitary works, and water supply works
12.4 Estimating norms and rate analysis
12.5 Bill of quantities, specifications and its type and purpose
12.6 Running bill and final bills and its payment procedures
12.7 Valuation : purpose, principles and methods

13. **Construction Management**
13.1 Construction scheduling and planning: network techniques (CPM, PERT) and bar charts
13.2 Contractual procedures and managements: types of contract, tender and tender notice, preparation of tender document, contractors pre-qualification, evaluation of tenders and selection of contractors, contract acceptance, conditions of contract, quotation and direct order, dispute resolution
13.3 Material management: procurement procedures and materials handling
13.4 Cost control and quality control in construction
13.5 Project maintenance
13.6 Project monitoring and evaluation
13.7 Variation , alteration and omissions
13.8 Occupational health and safety

14. **Engineering Economics**
14.1 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

15. **Ethics and Professionalism**
15.1 Ethics, integrity and professionalism: code of conduct and guidelines for professional engineering practices
15.2 Relation with clients, contractor and fellow professionals
15.3 Nepal Engineering Council Act, 2055; and Regulations, 2056
15.4 National Building Code: Hierarchy of building codes and its application, procedure for implementation of building code in Nepal
15.5 Building bylaws
15.6 Nepal Road Standard, 2027
15.7 Nepal Fedder Road Standard, 1997