काठमाण्डौ उपत्यका खानेपानी व्यवस्थापन बोर्ड
प्राविधिक सेवा, इञ्जिनियरिङ समूह, सिभिल इञ्जिनियर उपसमूह, ७ तह, जियोटेक इञ्जिनियर पदको खुला प्रतियोगितात्मक परीक्षाको पाठ्यक्रम

पाठ्यक्रमको रुपरेखा :– यस पाठ्यक्रमको आधारमा निम्नानुसारका चरणमा परीक्षा लिइने छ :

प्रथम चरण :– लिखित परीक्षा पूर्णाङ्क :– १००

द्वितीय चरण :– अन्तर्वार्ता पूर्णाङ्क :– २०

परीक्षा योजना (Examination Scheme)

१. प्रथम चरण : लिखित परीक्षा (Written Examination) **पूर्णाङ्क :- १००**

पत्र	विषय	पूर्णाङ्क	उत्तीर्णाङ्क	परीक्षा प्रणाली	प्रश्नसंख्या X अङ्क	समय
प्रथम	सेवा समूह सम्बन्धी	१००	४०	वस्तुगत बहुवैकल्पिक (Multiple Choice)	५० प्रश्न X १ अङ्क	३ घण्टा
				विषयगत (Subjective)	१० प्रश्न X ५ अङ्क	

२. द्वितीय चरण : अन्तर्वार्ता (Interview) **पूर्णाङ्क :- २०**

विषय	पूर्णाङ्क	परीक्षा प्रणाली
व्यक्तिगत अन्तर्वार्ता	२०	मौखिक

द्रष्टव्य :

१. लिखित परीक्षाको माध्यम भाषा नेपाली वा अंग्रेजी हुनेछ ।
२. लिखित परीक्षामा यथासम्भव पाठ्यक्रमका सबै एकाईबाट प्रश्नहरु सोधिनेछ ।
३. वस्तुगत बहुवैकल्पिक (Multiple Choice) प्रश्नहरुको 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 ।
४. विषयगत प्रश्नमा प्रत्येक पत्र/विषयका प्रत्येक खण्डका लागि छुट्टाछुट्टै उत्तरपुस्तिकाहरु हुनेछन् । परिक्षार्थीले प्रत्येक खण्डका प्रश्नहरुको उत्तर सोही खण्डका उत्तरपुस्तिकामा लेख्नुपर्नेछ ।
५. यस पाठ्यक्रम योजना अन्तर्गतका पत्र/विषयका विषयवस्तुमा जेसुकै लेखिएको भए तापनि पाठ्यक्रममा परेका कानून, ऐन, नियम तथा नीतिहरु परीक्षाको मिति भन्दा ३ महिना अगाडि (संशोधन भएका वा संशोधन भई हटाईएका वा थप गरी संशोधन भई) कायम रहेकालाई यस पाठ्क्रममा परेको सम्झनु पर्दछ ।
६. प्रथम चरणको परीक्षाबाट छनौट भएका उम्मेदवारहरुलाई मात्र द्वितीय चरणको परीक्षामा सम्मिलित गराइनेछ ।
७. पाठ्यक्रम लागू मिति :–

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पत्र/विषय :– सेवा समूह सम्बन्धी

खण्ड (क) – (५० अङ्क)

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 stricture - 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 Concrete Technology

2.1. Constituents and properties of concrete (physical and chemical)

2.2. Water cement ratio

2.3. Grade and strength of concrete, concrete mix design, testing of concrete

2.4. Admixtures

2.5. High strength concrete

2.6. Pre-stressed concrete technology

3 Construction Materials

3.1 Properties of building materials: physical, chemical, constituents, thermal, etc.

3.2 Stones – characteristics and requirements of stones as a binding materials

3.3 Ceramic materials: ceramic tiles, mosaic tile, brick types and testing

3.4 Cementing materials: types and properties of lime and cement; cement mortor tests

3.5 Metals: Steel; types and properties ; Alloys

3.6 Timber and wood: timber trees in Nepal ,types and properties of wood

3.7 Miscellaneous materials: Asphaltic materials (Asphalt, Bitumen and Tar); paints and varnishes; polymers

4 Construction Management

4.1 Construction scheduling and planning: networks techniques(CPM,PERT) and bar charts

4.2 Contractural procedure and management: types of contract, tender and tender notice, preparation of binding (tenser) 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 handelling

4.4 Quality Control Plan, Cost Control and Quality Control Mechanisms

4.5 Project maintenance

4.6 Occupational health and safety
4.7 Project monitoring and evaluation
4.8 Technical Auditing
4.9 Variation, alteration and omissions

5 Drawing Techniques

5.1 Drawing sheet composition and its essential components
5.2 Suitable scales, site plans, preliminary drawings, working drawings
5.3 Theory of projection drawing: perspective, orthographic and axonometric projection; first and third angle projection
5.4 Drawing tools and equipments
5.5 Drafting conventions and symbols
5.6 Topographic, electric, plumbing and structural drawings
5.7 Techniques of free hand drawing

6 Estimating and Costing Valuation and Specification

6.1 Types of estimates and their specific uses
6.2 Methods of calculating quantities
6.3 Key components of estimating norms and rate analysis
6.4 Preparation of bill of quantities
6.5 Purpose, types and importance of specification
6.6 Purpose, principles and methods of valuation

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 slop 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

खण्ड (ख) – (५० अङ्क)

10 Geotechnical Engineering

10.1 Soil Mechanics

10.1.1 Basic concepts: Definition of soil and soil mechanics; principal types of soils; Important properties of very fine soil; Characteristics of main clay mineral groups

10.1.2 Origin of soils, soil structure and fabric

10.1.3 Three-phase system and phase relationships

10.1.4 Index properties of soil; unit weight, porosity, void ratio, degree of saturation, soil consistency, classification of engineering soil, plasticity index

10.1.5 Unified soil classification system and its uses

10.1.6 Flow of water through a soil mass: Introduction, flow laws, field measurement of permeability, flow rate, flow nets, solutions of flow equations

10.1.7 Shear strength, Mohr circle, Mohr-Coulomb failure criteria, Lab test and shear strength

10.1.8 Compaction, Lab test, Field method of compaction, Compaction control

10.1.9 Consolidation, Lab test, Calculation of settlement, Degree of consolidation

10.1.10 Stability of slopes for finite and infinite slopes

10.2 Foundation Engineering

10.2.1 Introduction to foundation systems

10.2.2 Sub-surface investigations – scope, drilling bore holes, sampling, plate load test and penetration tests

10.2.3 Earth pressure theories, effect of water table, layered soils

10.2.4 Foundation types – foundation design requirements

10.2.5 Shallow foundations – bearing capacity, effect of shape, water table and other factor, stress distribution, settlement analysis in sands and clays

10.2.6 Deep foundations – pile types, dynamic and static formulae, load capacity of piles in sands and clays, negative skin friction

10.2.7 Combined footing and raft foundation

10.2.8 Foundation maintenance, underpinning, modification of foundation soil

10.2.9 Liquefaction and its preventive measure

10.2.10 Geotextiles – Behaviour of soils on reinforcing with geotextiles – effect on strength, bearing capacity, compaction and permeability – design aspects – slopes – clay embankments – retaining walls - pavements

11 Fluid Mechanics and Hydraulic Machinery

11.1 Fluid properties, Hydrostatic forces and Fluid kinematics

11.2 Fluid dynamics, Flow measurement, Notches and Weir, Viscous flow theory

11.3 Fluid through pipes, Turbulent flow, Boundary Layer theory

11.4 Open channel flow

11.5 Pumps, Jets and Turbines

12 Water Resources and Hydrology

12.1 General aspects of hydrology
12.2 Infiltration, Runoff and Hydrograph
12.3 Planning and design of water storage reservoir
12.4 Floods, flood routing and flood control measures

13 Water Supply and Sanitation

13.1 Rural and community based water system
13.2 Water Supply sources and their management
  13.1.1 Surface water
  13.1.2 Ground water
13.3 Selection of source
13.4 Water quality and treatment, water demand and supply, source protection
13.5 Intakes, collection chamber and break pressure tanks
13.6 Reservoir and distribution system
13.7 Intake, reservoir, pipeline design,, design of transmission and distribution system
13.8 Pipe and fittings: Pipe materials, pipe laying and fittings
13.9 Operation and maintenance of water supply systems
13.10 Sanitation, wastewater and solid waste management
  13.10.1 On-site sanitation system
  13.10.2 Types of sewerage system, design and construction of sewers
  13.10.3 Types, characteristics, sources, quantity, generation, collection, transportation and disposal of solid wastes
  13.10.4 Sanitary landfill, incineration, composting

14 Environment and Climate Change

14.1 Introduction of Water pollutants, its causes, impact and remedial measures
14.2Human excreta and its characteristics, pollution caused by excreta, health aspects
14.3Solid waste management
  14.3.1 Types and characteristics of solid waste
  14.3.2 Garbage collection and disposal
  14.3.3 Method of solid waste disposal: dumping, sanitary land fill, incineration and composting
14.4Concept of Environmental Assessment
  14.4.1 Initial Environmental Examination (IEE)
  14.4.2 Environmental Impact Assessment (EIA), role of EIA
  14.4.3 Types of Environmental Impacts, and EIA principles
  14.4.4 Government rules and Regulation and procedures for EIA
14.5Climate change management in water supply
  14.5.1 General concept of global climate change phenomenon
  14.5.2 National, Local & Secteral Adaption Plan of Action (NAPA, LAPA & SAPA)
  14.5.3 Climate change treats on water supply projects
  14.5.4 Vulnerability analysis and adaption plan for climate change effect on water supply projects

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15 खानेपानी व्यवस्थापन सम्वन्धी

15.1 नेपालमा खानेपानीको वर्तमान अवस्था, संभावना र चुनौतीहरु
15.2 काठमाण्डौ उपत्यका खानेपानी व्यवस्थापन वोर्डको परिचय, संगठनात्मक संरचना र कार्यक्षेत्र
15.3 नेपालमा खानेपानी व्यवस्थापनको भावी रणनीति र कार्यदिशा
15.4 खानेपानी र सरसफाई मन्त्रालय तथा खानेपानी व्यवस्थापन वोर्ड वीचको अन्तरसम्वन्ध
15.5 काठमाण्डौ उपत्यका खानेपानी लिमिटेड स्थापना, क्रियाकलाप र प्रगति
15.6 खानेपानी महशुल निर्धारण आयोगको काम, कर्तव्य र अधिकार
15.7 आयोजना कार्यान्वयन निर्देशनालय
15.8 सार्वजनिक नीजि साझेदारी (PPP) को अवधारणा र जिम्मेवारी हस्तान्तरण
15.9 दिगो विकास लक्ष्य (Sustainable Development Goals) र खानेपानी
15.10 आयोजना/परियोजना व्यवस्थापन र नेपालको अवस्था
15.11 फोहेरमैला व्यवस्थापन, सरसफाई र ढल निकास

16 संबिधान, ऐन, नियम र नीति

16.1 नेपालको वर्तमान संविधान
16.2 खानेपानी व्यवस्थापन वोर्ड ऐन, २०६३
16.3 काठमाडौ उपत्यका खानेपानी व्यवस्थापन बोर्ड नियमावली, २०६४
16.4 काठमाण्डौ उपत्यका खानेपानी व्यवस्थापन वोर्ड कर्मचारी प्रशासन नियमावली/विनियमावली
16.5 काठमाण्डौ उपत्यका खानेपानी व्यवस्थापन वोर्डको आर्थिक प्रशासन नियमावली/विनियमावली
16.6 काठमाण्डौ उ पत्यका खानेपानी व्यवस्थापन वोर्डका कर्मचारीहरुले पालना गर्नुपर्ने आचरणहरु
16.7 काठमाण्डौ उपत्यका भूमिगत जलश्रोत व्यवस्थापन नीति, २०६९
16.8 भूमिगत श्रोतको पानी निकाल्न तथा उपयोग गर्न अनुमती पत्र जारी गर्ने निर्देशिका, २०७१
16.9 राष्ट्रिय खानेपानी गुणस्तर मापदण्ड, २०६२
16.10 खानेपानी महशुल निर्धारण आयोग ऐन, २०६३
16.11 उपभोक्ता संरक्षण ऐन, २०५४ र उपभोक्ता संरक्षण नियमावली, २०५५
16.12 वातावरण संरक्षण ऐन, २०५३ र वातावरण संरक्षण नियमावली २०५४
16.13 जलश्रोत ऐन, २०४९ र जलश्रोत नियमावली, २०५०
16.14 भ्रष्टाचार निवारण ऐन, २०५९
16.15 सार्वजनिक खरिद ऐन, २०६३ र सार्वजनिक खरिद नियमावली, २०६४

यस पत्रको लागि यथासम्भव निम्नानुसार प्रश्नहरु सोधिने छ।

पत्र/विषय :– सेवा समूह सम्बन्धी				
विषय	**खण्ड**	**अङ्कभार**	**वस्तुगत**	**विषयगत**
सेवा सम्वन्धी	**(क)**	५०	२५ प्रश्न X १ अङ्क = २५	५ प्रश्न X ५ अङ्क = २५
	(ख)	५०	२५ प्रश्न X १ अङ्क = २५	५ प्रश्न X ५ अङ्क = २५
जम्मा		**१००**	५० प्रश्न X १ अङ्क = ५०	१० प्रश्न X ५ अङ्क = ५०