प्रदेश लोक सेवा आयोग, बागमती प्रदेश
इन्जिनियरिङ सेवा, एगृ. इरिगेशन समूह, पाँचौँ तह, सि.ए.ओ. वा सो सरह पदको खुला प्रतियोगितात्मक परीक्षाको पाठ्यक्रम

यस पाठ्यक्रम योजनालाई दुई चरणमा विभाजन गरिएको छ :

प्रथम चरण :– लिखित परीक्षा (Written Examination) पूर्णाङ्क :– २००

द्वितीय चरण :- अन्तर्वार्ता (Interview) पूर्णाङ्क :– ३०

परीक्षा योजना **(Examination Scheme)**

प्रथम चरण : लिखित परीक्षा **(Written Examination)** पूर्णाङ्क :– २००

पत्र	विषय	पूर्णाङ्क	उत्तीर्णाङ्क	परीक्षा प्रणाली		प्रश्नसंख्या ×अङ्क	समय
प्रथम	**भाग : १** सामान्य ज्ञान र सामान्य अभिक्षमता परीक्षण (Part-I: General Awareness & General Aptitude Test)	100	40	वस्तुगत (Objective)	बहुवैकल्पिक प्रश्न (MCQs)	२५ प्रश्न × २ अङ्क	४५ मिनेट
	भागः २ सेवा सम्बन्धित कार्य-ज्ञान (Part-II: Job related functional knowledge)					२५ प्रश्न × २ अङ्क	
द्वितीय	सेवा सम्बन्धित कार्य-ज्ञान (Job related functional knowledge)	100	40	विषयगत (Subjective)	छोटो उत्तर (Short Answer) लामो उत्तर (Long Answer)	१२ प्रश्न × ५ अङ्क ४ प्रश्न ×१० अङ्क	२ घण्टा १५ मिनेट

द्वितीय चरण : अन्तर्वार्ता **(Interview)** पूर्णाङ्क :– ३०

पत्र	पूर्णाङ्क	उत्तीर्णाङ्क	परीक्षा	समय
अन्तर्वार्ता (Interview)	30		बोर्ड अन्तर्वार्ता (Board Interview)	-

द्रष्टव्य :

1. यस पाठ्यक्रम योजनालाई प्रथम चरण र द्वितीय चरण गरी दुई भागमा विभाजन गरिएको छ ।
2. लिखित परीक्षाको प्रश्नपत्रको माध्यम भाषा पाठ्यक्रमको विषयवस्तु जुन भाषामा दिइएको छ सोही भाषाको आधारमा नेपाली वा अङ्ग्रेजी मध्ये कुनै एक मात्र भाषा हुनेछ । तर विषयवस्तुलाई स्पष्ट गर्नुपर्ने अवस्थामा दुवै भाषा समेत प्रयोग गर्न सकिने छ ।
3. लिखित परीक्षाको माध्यम भाषा नेपाली वा अङ्ग्रेजी अथवा नेपाली र अङ्ग्रेजी दुवै हुनेछ ।
4. प्रथम पत्र र द्वितीय पत्रको लिखित परीक्षा छुट्टाछुट्टै हुनेछ ।
५. प्रथम पत्रको सेवा सम्बन्धित कार्य-ज्ञान (Job related functional knowledge) अन्तर्गतको २५ प्रश्नको पाठ्यक्रम द्वितीय पत्रको सेवा सम्बन्धी कार्य-ज्ञान (Job related functional knowledge) मा निर्धारण गरिएको पाठ्यक्रम नै हुनेछ ।
6. वस्तुगत बहुवैकल्पिक (Multiple Choice) प्रश्नहरूको 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 ।
7. वस्तुगत बहुवैकल्पिक हुने परीक्षामा परीक्षार्थीले उत्तर लेख्दा अङ्ग्रेजी ठूलो अक्षरहरू (Capital letters): A,

B, C, D मा लेख्नुपर्नेछ । सानो अक्षरहरू (Small letters): a, b, c, d लेखेको वा अन्य कुनै सङ्केत गरेको भए सबै उत्तरपुस्तिका रद्द हुनेछ । साथै OMR sheet प्रयोग हुने परीक्षामा परीक्षार्थीलाई दिइएको निर्देशन अनुसारको सङ्केत प्रयोग गर्नु पर्नेछ ।

8. बहुवैकल्पिक प्रश्नहरू हुने परीक्षामा कुनै प्रकारको क्याल्कुलेटर (Calculator) प्रयोग गर्न पाइने छैन ।
9. परीक्षामा परीक्षार्थीले मोबाइल लगायत कुनै प्रकारका विद्युतीय उपकरण परीक्षा हलमा लैजान पाइने छैन ।
10. विषयगत प्रश्नहरूको हकमा तोकिएको अङ्कको एउटा लामो प्रश्न वा एउटै प्रश्नको 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 ।
11. विषयगत प्रश्न हुनेको हकमा प्रत्येक खण्डका लागि छुट्टाछुट्टै उत्तरपुस्तिकाहरू हुनेछन् । परीक्षार्थीले प्रत्येक खण्डको प्रश्नहरूको उत्तर सोहीखण्डको उत्तरपुस्तिकामा लेख्नुपर्नेछ ।
12. परीक्षामा सोधिने प्रश्नसङ्ख्या, अङ्क र अङ्कभार यथासम्भव सम्बन्धित पत्र/विषयमा दिइए अनुसार हुनेछ ।
13. 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 हटाइएका वा थप गरी संशोधन भइ) कायम रहेकालाई यस पाठ्यक्रममा परेको सम्झनु पर्दछ ।
14. प्रथम चरणको परीक्षाबाट छनौट भएका उम्मेदवारहरूलाई मात्र द्वितीय चरणको परीक्षामा सम्मिलित गराइनेछ ।
15. यस भन्दा अगाडि लागु भएका माथि उल्लेखित सेवा, समूहको पाठ्यक्रम खारेज गरिएको छ ।
16. पाठ्यक्रम लागु मिति : - २०७९/९/१०

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प्रथम पत्र (Paper I) :-
सामान्य ज्ञान र सामान्य अभिक्षमता परीक्षण तथा सेवा सम्बन्धित कार्य-ज्ञान

भाग (Part I) :
सामान्य ज्ञान र सामान्य अभिक्षमता परीक्षण
(General Awareness and General Aptitude Test)
(२५ प्रश्न × २ अङ्क= ५० अङ्क)

1. सामान्य ज्ञान (General Awareness) (८ × २ अङ्क =१६ अङ्क)

1.1 नेपालको भौगोलिक अवस्था, प्राकृतिक स्रोत र साधनहरू
1.2 नेपालको ऐतिहासिक, सांस्कृतिक र सामाजिक अवस्था सम्बन्धी जानकारी
1.3 नेपालको आर्थिक अवस्था र चालु आवधिक योजना सम्बन्धी जानकारी
1.4 जैविक विविधता, दिगो विकास, वातावरण, प्रदूषण, जलवायु परिवर्तन र जनसंख्या व्यवस्थापन
1.5 मानव जीवनमा प्रत्यक्ष प्रभाव पार्ने विज्ञान र प्रविधिका महत्वपूर्ण उपलब्धिहरू
1.6 जनस्वास्थ्य, रोग, खाद्य र पोषण सम्बन्धी सामान्य जानकारी
1.7 नेपालको संविधान (भाग १ देखि ५ सम्म र अनुसूचीहरू)
1.8 संयुक्त राष्ट्रसंघ र यसका विशिष्टीकृत संस्था सम्बन्धी जानकारी
1.9 क्षेत्रीय सङ्गठन (सार्क, बिमस्टेक, आसियान र युरोपियन संघ) सम्बन्धी जानकारी
1.10 राष्ट्रिय र अन्तर्राष्ट्रिय महत्वका समसामयिक गतिविधिहरू

2. सार्वजनिक व्यवस्थापन (Public Management) (८ × २ अङ्क=१६ अङ्क)

2.1 कार्यालय व्यवस्थापन (Office Management)
  2.1.1 कार्यालय (Office) : परिचय, महत्व, कार्य र प्रकार
  2.1.2 सहायक कर्मचारीका कार्य र गुणहरू
  2.1.3 कार्यालय स्रोत साधन (Office Resources): परिचय र प्रकार
  2.1.4 कार्यालयमा सञ्चारको महत्व, किसिम र साधन
  2.1.5 कार्यालय कार्यविधि (Office Procedure) : पत्र व्यवहार (Correspondence), दर्ता र चलानी (Registration & Dispatch), परिपत्र (Circular), तोक आदेश (Order), टिप्पणी लेखन र टिप्पणी तयार पार्दा ध्यान दिनुपर्ने कुराहरू
  2.1.6 अभिलेख व्यवस्थापन (Record Management)
2.2 निजामती सेवा ऐन र नियमावलीमा भएका देहायका व्यवस्थाहरू
  2.2.1 निजामती सेवाको गठन, सङ्गठन संरचना, पदपूर्ति गर्ने तरिका र प्रक्रियाहरू
  2.2.2 कर्मचारीको नियुक्ति, सरुवा, बढुवा, बिदा, विभागीय सजाय र अवकाश
  2.2.3 कर्मचारीले पालन गर्नुपर्ने आचरण र कर्तव्यहरू
2.3 सरकारी बजेट, लेखा र लेखापरीक्षण प्रणाली सम्बन्धी सामान्य जानकारी
2.4 सार्वजनिक सेवा प्रवाहको अर्थ, सेवा प्रवाह गर्ने निकाय, तरिका र माध्यमहरू
2.5 सार्वजनिक बडापत्र (Public Charter) : महत्व र आवश्यकता
2.6 व्यवस्थापनका अवधारणा तथा सार्वजनिक व्यवस्थापनमा निर्देशन, नियन्त्रण, समन्वय, निर्णय प्रक्रिया, उत्प्रेरणा र नेतृत्व सम्बन्धी जानकारी
2.7 मानवीय मूल्य मान्यता (Human Values), नागरिकका कर्तव्य र दायित्व तथा अनुशासन

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3. सामान्य अभिक्षमता परीक्षण (General Aptitude Test) (५ × २ अङ्क=१० अङ्क)

3.1 शाब्दिक अभिक्षमता परीक्षण (Verbal Aptitude Test) : यस परीक्षणमा शब्दज्ञान, अनुक्रम, समरूपता, वर्गीकरण, कोडिङ-डिकोडिङ, दिशा र दुरी ज्ञान परीक्षण (direction & distance sense test), तर्क विचार सम्बन्धी (logical reasoning), पङ्क्तिक्रम (ranking order) आदि विषयवस्तुबाट प्रश्नहरू समावेश गरिनेछ ।

3.2 संख्यात्मक अभिक्षमता परीक्षण (Numerical Aptitude Test) : यस परीक्षणमा अनुक्रम, समरुपता, वर्गीकरण, कोडिङ, मेट्रिक्स, अङ्कगणितीय तर्क/क्रिया सम्बन्धी, प्रतिशत, भिन्न, अनुपात, औसत, समय र काम, आदि विषयवस्तुबाट प्रश्नहरू समावेश गरिनेछ ।

3.3 अशाब्दिक अभिक्षमता परीक्षण (Non-Verbal/Abstract Aptitude Test) : यस परीक्षणमा अनुक्रम, समरूपता, वर्गीकरण, भेन चित्र, मेट्रिक्स, त्रिभुज र वर्गहरूको रचना, चित्र वा आकृति बनावट र विश्लेषण, आदि विषयवस्तुबाट प्रश्नहरू समावेश गरिनेछ ।

3.4 रुजु गर्ने (Verification test) र फाइलिङ अभिरुचि परीक्षण (Filing aptitude test): रुजु गर्ने (Verification test), परीक्षणमा तथ्यांङ्क, सङ्ख्या वा शाब्दिक सूचनालाई जाँच गर्ने वा त्रुटी पत्ता लगाउने अथवा समानता वा भिन्नता पत्ता लगाउने किसिमका प्रश्नहरू समावेश हुनेछन् । फाइलिङ अभिरुचि परीक्षण (Filing aptitude test) मा शाब्दिक र सङ्ख्यात्मक फाइलिङ वस्तु वा प्रक्रियालाई वर्णमालाक्रम, सङ्ख्यात्मकक्रम वा कालक्रम अनुसार समाधान गर्ने किसिमका प्रश्नहरू समावेश हुनेछन् ।

3.5 निर्देशन अनुसरण गर्ने (Follows the instructions) र विश्लेषणात्मक तार्किकता परीक्षण (Analytical reasoning test): निर्देशन अनुसरण गर्ने (Follows the instructions) परीक्षणमा दिइएका लिखित निर्देशनलाई हुबहु अनुसरण गरी समाधान गर्ने किसिमका प्रश्नहरू समावेश हुनेछन् । विश्लेषणात्मक तार्किकता परीक्षण (Analytical reasoning test) मा शाब्दिक वा सङ्ख्यात्मक वा अशाब्दिक (चित्रात्मक) किसिमका विश्लेषणात्मक तार्किकता सम्बन्धी प्रश्नहरू समावेश हुनेछन् ।

4. नेपाली र अङ्ग्रेजी भाषा: (४ × २ अङ्क=८ अङ्क)

4.1 English: Knowledge on writing correct English sentences, letters, and reports according to English grammar based on the following syntactic functions: (२ × २ अङ्क=४ अङ्क)

a. Parts of Speech:
b. Noun
c. Pronoun
d. Adjective
e. Determiner
f. Verb
g. Adverb
h. Preposition
i. Conjunction and
j. Interjection
k. Infinitives and gerunds, reported speech and tenses

4.2 नेपाली: नेपाली भाषामा स्तरीय शुद्ध शब्द, वाक्यांश र वाक्य लेखनको लागि आवश्यक पर्ने ह्रस्व दीर्घ, ब र व, तथा श, ष, स लगायतका व्याकरणगत शुद्ध लेखनशैलीमा केन्द्रित शुद्ध शब्द, वाक्यांश र वाक्य लेखनसहितको नेपाली भाषाको शुद्धाशुद्धिको ज्ञान (२ × २ अङ्क=४ अङ्क)

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भाग (Part II) :-

सेवा सम्बन्धित कार्य-ज्ञान (Job related functional Knowledge)

(२५ प्रश्न × २ अङ्क = ५० अङ्क)

1. General Agriculture and Agricultural Engineering

1.1 Principles of agronomy (cereals, cash crops, pulses, vegetables, fruits and oilseed)
1.2 Introduction to sociology and rural development
1.3 Elements of soil science (soil fertility, properties and classification)
1.4 Soil water, soil moisture tension, infiltration, permeability, wilting coefficient and conductivity
1.5 Plant water relationship, evaporation, transpiration and consumptive use, evapotranspiration (ET) estimation methods
1.6 Water requirements, irrigation frequencies, and irrigation effectiveness
1.7 Method of Irrigation (Furrow irrigation, border irrigation and check basin irrigation, Sprinkler and drip/tickle irrigation)
1.8 Type of drainage system, surface and sub surface drainage system
1.9 Ground water and aquifers, hydraulics of wells
1.10 Water erosion (rain drop erosion, rill erosion, gully erosion, stream channel erosion)
1.11 Human, animal, electrical and mechanical powers
1.12 Introduction to primary and secondary agricultural implements

2. General Engineering

2.1 Mechanical Engineering

2.1.1 Work, power and energy
2.1.2 Basic knowledge on workshop technology and metallurgy
2.1.3 Fluid mechanics (compressible and incompressible fluids, viscosity, Bernoulli theorem, Archimedes' principle, buoyancy)
2.1.4 Thermodynamics (laws of thermodynamics, Carnot engine, entropy, enthalpy, kinetic theory of gases)
2.1.5 Basic knowledge on thermal energy conversion, fossil fuels, and refrigerants
2.1.7 Design of machines (machines related to agriculture)

2.2 Civil Engineering

2.3.1 Engineering hydrology (hydrological cycle, measurement and analysis of precipitation; measurement, estimation and analysis of runoff, stream flow, evaporation, flood, hydrograph)
2.3.2 Design of structures (RCC beams, columns, slabs, and trusses in steel and timber)
2.3.3 Building construction technology (brick and stone masonry, concreting, damp proof course, floorings, roofing, plastering, carpentry, painting)
2.3.4 Estimating and costing of buildings, irrigation, farm and other agricultural structures.

3. Surveying

3.1 General

3.1.1 Classifications
3.1.2 Principle of surveying
3.1.3 Selection of suitable method

3.1.4 Scales, plans and maps
2.1.5 Entry into survey field books and level books

3.2 Leveling
3.2.1 Methods of leveling
3.2.2 Leveling instruments and accessories
3.2.3 Principles of leveling

3.3 Plane Tabling
3.3.1 Equipment required
3.3.2 Methods of plane tabling
3.3.3 Two and three point problems

3.4 Theodolite and Traverse surveying
3.4.1 Basic difference between theodolites
3.4.2 Temporary adjustments of theodolites
3.4.3 Fundamental lines and desired relations
3.4.4 Tachometry: stadia method
3.4.5 Trigonometrical leveling
3.4.6 Checks in closed traverse

3.5 Contouring
3.5.1 Characteristics of contour lines
3.5.2 Method of locating contours
3.5.3 Contour plotting

3.6 Setting Out
3.6.1 Small buildings
3.6.2 Simple curves

4. Construction Materials

4.1 Stone
4.1.1 Formation and availability of stones in Nepal
4.1.2 Methods of laying and construction with various stones

4.2 Cement
4.2.1 Different cements: Ingredients, properties and manufacture
4.2.2 Storage and transport
4.2.3 Admixtures

4.3 Clay and Clay Products
4.3.1 Brick: type, manufacture, laying, bonds

4.4 Paints and Varnishes
4.4.1 Type and selection
4.4.2 Preparation techniques
4.4.3 Use

5. Mechanics of Materials and Structures

5.1 Mechanics of Materials
5.1.1 Internal effects of loading
5.1.2 Ultimate strength and working stress of materials

5.2 Mechanics of Beams
5.2.1 Relation between shear force and bending moment
5.2.2 Thrust, shear and bending moment diagrams for statically determinate beams under various types of loading

5.3 Simple Strut Theory

6. Hydraulics

6.1 General

6.1.1 Properties of fluid: mass, weight, specific weight, density, specific volume, specific gravity, viscosity

6.1.2 Pressure and Pascal's Law

6.2 Hydro Kinematics and Hydro Dynamics

6.2.1 Energy of flowing liquid: elevation energy, kinetic energy, potential energy, internal energy

6.3 Measurement of Discharge

6.3.1 Weirs and notches

6.3.2 Discharge formulas

6.4 Flows

6.4.1 Characteristics of pipe flow and open channel flow

7. Soil Mechanics

7.1 General

7.1.1 Soil types and classification

7.1.2 Three phase system of soil

7.1.3 Unit weight of soil mass: bulk density, saturated density, submerged density and dry density

7.1.4 Interrelationship between specific gravity, void ratio, porosity, degree of saturation, percentage of air voids air content and density index

7.2 Soil Water Relation

7.2.1 Terzaghi's principle of effective stress

7.2.2 Darcy's law

7.2.3 Factors affecting permeability

7.3 Compaction of Soil

7.3.1 Factors affecting soil compaction\

7.3.2 Optimum moisture content

7.3.3 Relation between dry density and moisture content

7.4 Shear Strength of Soils

7.4.1 Mohr-Coulomb failure theory

7.4.2 Cohesion and angle of internal friction

7.5 Earth Pressures

7.5.1 Active and passive earth pressures

7.5.2 Lateral earth pressure theory

7.5.3 Rankine's earth pressure theory

7.6 Foundation Engineering

7.6.1 Terzaghi's general bearing capacity formulas and their application

8. Structural Design

8.1 R.C. Section in Bending

8.1.1 Under reinforced, over reinforced and balanced sections

8.1.2 Analysis of single and double reinforced rectangular sections

8.2 Shear and Bond for a R.C Section

8.2.1 Shear resistance of a R.C section

8.2.2 Types of shear reinforcement and their design

8.2.3 Determination of anchorage length

8.3 Axially Loaded R.C. columns

8.3.1 Short and long columns

8.3.2 Design of a rectangular column section

8.4 Design and Drafting of R.C. Structures
- 8.4.1 Singly and doubly reinforced rectangular beams
- 8.4.2 Simple one way and two way slabs
- 8.4.3 Axially loaded short and long columns

9. Building Construction Technology

9.1 Foundations
- 9.1.1 Subsoil exploration
- 9.1.2 Type and suitability of different foundations: shallow, deep
- 9.1.3 Shoring and dewatering
- 9.1.4 Design of simple brick / stone masonry and RCC foundations

9.2 Walls
- 9.2.1 Type of walls and their functions
- 9.2.2 Choosing wall thickness, height to length relation
- 9.2.3 Use of scaffolding

9.3 Damp Proofing
- 9.3.1 Sources of dampness
- 9.3.2 Remedial measures to prevent dampness

9.4 Concrete Technology
- 9.4.1 Constituents of cement concrete
- 9.4.2 Grading of aggregates
- 9.4.3 Concrete mixes
- 9.4.4 Water cement ratio

9.5 Factors affecting strength of concrete

9.6 Form work

9.7 Curing

10. Soil and Water Engineering

10.1 Water Conveyance and Control
- 10.1.1 Design of open channels, channel linings, drop structures and spillways, water control and division structures
- 10.1.2 Design of under ground pipe conveyance system

10.2 Land Development
- 10.2.1 Land leveling-grading design methods, estimation of earthwork quantities, leveling and grading procedures, equipment for land grading and field layout

10.3 Ground Water, Irrigation Wells and Pumps
- 10.3.1 Design of wells
- 10.3.2 Wells construction procedures
- 10.3.3 Indigenous water lifting devices, positive displacement pumps, centrifugal pumps, vertical turbine pumps, submersible pumps, propeller and mixed flow pumps, selection of pumps and their performances, repaired and maintenance

10.4 Water Erosion and Control Measures
- 10.4.1 Soil losses and its measurement
- 10.4.2 Erosion control measures (engineering and bioengineering methods)
- 10.4.3 Conservation structures, watershed management and water harvesting techniques

11. Farm Structure Development

11.1 Planning of farmstead, farm residence, water supply and sanitation

11.2 Farm road, farm fencing, farm ponds, farm irrigation and drainage

11.3 Animal Shelters
- 11.3.1 Dairy barn (housing requirements, stanchion and loose housing barns with

milking barn, pen barn)

11.3.2 Poultry housing (housing requirements, types of poultry house, brooder house

11.3.3 Ship and goat housing (types, housing requirements, construction material, layout

11.3.4 Swine housing (types, housing requirements, construction materials, layout

11.3.5 Aqua cultural engineering (types, pond construction)

11.4 Storage Structures

11.4.1 Fodder storage structure, feed storage structure, food grain storage structure, indigenous storage structure, bag storage structure, grain bins, and modern godowns

11.4.2 Farm machinery storage structure and farm workshop

11.5 Farm and Rural Electrification

11.5.1 Power transmission and distribution, house wiring and its components

11.5.2 AC motor (single phase and poly phase), starters, selection of electric motors, care and maintenance of electric equipments

11.6 Micro-hydro power plants

12. Estimating and Costing

12.1 General

12.1.1 Main items of work

12.1.2 Units of measurement and payment of various items of work and material

12.1.3 Standard estimate formats of government offices

12.2 Rate Analysis

12.2.1 Basic general knowledge of the use of rate analysis norms prepared by concerned Ministry and the district rates prescribed by district cordination committee

12.3 Specifications

12.3.1 Interpretation of specifications

12.4 Valuation

12.4.1 Methods of valuation

13. Construction Management

13.1 Organization

13.1.1 Need for organization

13.1.2 Responsibilities of a civil overseer

13.1.3 Relation between owner, contractor and engineer

13.2 Site Management

13.2.1 Preparation of site plan

13.2.2 Organizing labor

13.2.3 Measures to improve labor efficiency

13.2.4 Accident prevention

13.3 Contract Procedure

13.3.1 Contracts

13.3.2 Departmental works and day work

13.3.3 Types of contracts

13.3.4 Tender and tender notice

13.3.5 Earnest money and security deposit

13.3.6 Preparation before inviting tender

13.3.7 Agreement

13.3.8 Conditions of contract

13.3.9 Construction supervision

13.4 Accounts
- 13.4.1 Administrative approval and technical sanction
- 13.4.2 Familiarity with standard account keeping formats used in governmental organizations
- 13.4.3 Muster roll
- 13.4.4 Completion report

13.5 Planning and Control
- 13.5.1 Construction schedule
- 13.5.2 Equipment and materials schedule
- 13.5.3 Construction stages and operations
- 13.5.4 Bar chart

14. Rural Engineering

14.1 Green Roads

14.2 Water Supply and Sanitation Engineering
- 14.2.1 General
- 14.2.2 Objectives of water supply system
- 14.2.3 Source of water and its selection: gravity and artisan springs, shallow and deep wells; infiltration galleries
- 14.2.4 Gravity Water Supply System
- 14.2.5 Design period
- 14.2.6 Determination of daily water demand
- 14.2.7 Determination of storage tank capacity
- 14.2.8 Selection of pipe
- 14.2.9 Pipe line design and hydraulic grade line

14.3 Bio engineering Measures

14.4 Renewable Energy

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प्रथम पत्रको लागि यथासम्भव निम्नानुसार प्रश्नहरु सोधिने छ :

भाग	विषयवस्तु	परीक्षा प्रणाली	अङ्कभार	प्रश्न संख्या × अङ्क
I	सामान्य ज्ञान र सामान्य अभिक्षमता परीक्षण (General Awareness & General Aptitude Test)	बहुवैकल्पिक प्रश्न (MCQs)	५०	२५ प्रश्न × २ अङ्क= ५०
II	सेवा सम्बन्धित कार्य-ज्ञान (Job related functional knowledge)		५०	२५ प्रश्न × २ अङ्क= ५०

प्रथम पत्रको <u>भाग **(Part II)**</u> सेवा सम्बन्धित कार्य-ज्ञान (Job related functional knowledge) को पाठ्यक्रमको एकाइबाट परीक्षामा यथासम्भव देहाय बमोजिम प्रश्नहरू सोधिने छ :

एकाइ	१	२	३	४	५	६	७	८	९	१०	११	१२	१३	१४
प्रश्न सङ्ख्या	२	१	२	१	१	२	२	२	२	२	२	२	२	२

प्रदेश लोक सेवा आयोग, बागमती प्रदेश
इन्जिनियरिङ सेवा, एगृ. इरिगेशन समूह, पाँचौँ तह, सि.ए.ओ. वा सो सरह पदको खुला प्रतियोगितात्मक परीक्षाको पाठचक्रम

द्वितीय पत्र (Paper II) :-

सेवा सम्बन्धित कार्य-ज्ञान (Job related functional Knowledge)

खण्ड (Section) (A) : - ५० अङ्क

1. General Agriculture and Agricultural Engineering

1.1 Principles of agronomy (cereals, cash crops, pulses, vegetables, fruits and oilseed)
1.2 Introduction to sociology and rural development
1.3 Elements of soil science (soil fertility, properties and classification)
1.4 Soil water, soil moisture tension, infiltration, permeability, wilting coefficient and conductivity
1.5 Plant water relationship, evaporation, transpiration and consumptive use, evapotranspiration (ET) estimation methods
1.6 Water requirements, irrigation frequencies, and irrigation effectiveness
1.7 Method of Irrigation (Furrow irrigation, border irrigation and check basin irrigation, Sprinkler and drip/tickle irrigation)
1.8 Type of drainage system, surface and sub surface drainage system
1.9 Ground water and aquifers, hydraulics of wells
1.10 Water erosion (rain drop erosion, rill erosion, gully erosion, stream channel erosion)
1.11 Human, animal, electrical and mechanical powers
1.12 Introduction to primary and secondary agricultural implements

2. General Engineering

2.1 Mechanical Engineering

2.1.1 Work, power and energy
2.1.2 Basic knowledge on workshop technology and metallurgy
2.1.3 Fluid mechanics (compressible and incompressible fluids, viscosity, Bernoulli theorem, Archimedes' principle, buoyancy)
2.1.4 Thermodynamics (laws of thermodynamics, Carnot engine, entropy, enthalpy, kinetic theory of gases)
2.1.5 Basic knowledge on thermal energy conversion, fossil fuels, and refrigerants
2.1.7 Design of machines (machines related to agriculture)

2.2 Civil Engineering

2.3.1 Engineering hydrology (hydrological cycle, measurement and analysis of precipitation; measurement, estimation and analysis of runoff, stream flow, evaporation, flood, hydrograph)
2.3.2 Design of structures (RCC beams, columns, slabs, and trusses in steel and timber)
2.3.3 Building construction technology (brick and stone masonry, concreting, damp proof course, floorings, roofing, plastering, carpentry, painting)
2.3.4 Estimating and costing of buildings, irrigation, farm and other agricultural structures.

3. Surveying

3.1 General

3.1.1 Classifications
3.1.2 Principle of surveying
3.1.3 Selection of suitable method

3.1.4 Scales, plans and maps
2.1.5 Entry into survey field books and level books

3.2 Leveling
3.2.1 Methods of leveling
3.2.2 Leveling instruments and accessories
3.2.3 Principles of leveling

3.3 Plane Tabling
3.3.1 Equipment required
3.3.2 Methods of plane tabling
3.3.3 Two and three point problems

3.4 Theodolite and Traverse surveying
3.4.1 Basic difference between theodolites
3.4.2 Temporary adjustments of theodolites
3.4.3 Fundamental lines and desired relations
3.4.4 Tachometry: stadia method
3.4.5 Trigonometrical leveling
3.4.6 Checks in closed traverse

3.5 Contouring
3.5.1 Characteristics of contour lines
3.5.2 Method of locating contours
3.5.3 Contour plotting

3.6 Setting Out
3.6.1 Small buildings
3.6.2 Simple curves

4. Construction Materials

4.1 Stone
4.1.1 Formation and availability of stones in Nepal
4.1.2 Methods of laying and construction with various stones

4.2 Cement
4.2.1 Different cements: Ingredients, properties and manufacture
4.2.2 Storage and transport
4.2.3 Admixtures

4.3 Clay and Clay Products
4.3.1 Brick: type, manufacture, laying, bonds

4.4 Paints and Varnishes
4.4.1 Type and selection
4.4.2 Preparation techniques
4.4.3 Use

5. Mechanics of Materials and Structures

5.1 Mechanics of Materials
5.1.1 Internal effects of loading
5.1.2 Ultimate strength and working stress of materials

5.2 Mechanics of Beams
5.2.1 Relation between shear force and bending moment
5.2.2 Thrust, shear and bending moment diagrams for statically determinate beams under various types of loading

5.3 Simple Strut Theory

6. Hydraulics

6.1 General

6.1.1 Properties of fluid: mass, weight, specific weight, density, specific volume, specific gravity, viscosity

6.1.2 Pressure and Pascal's Law

6.2 Hydro Kinematics and Hydro Dynamics

6.2.1 Energy of flowing liquid: elevation energy, kinetic energy, potential energy, internal energy

6.3 Measurement of Discharge

6.3.1 Weirs and notches

6.3.2 Discharge formulas

6.4 Flows

6.4.1 Characteristics of pipe flow and open channel flow

7. Soil Mechanics

7.1 General

7.1.1 Soil types and classification

7.1.2 Three phase system of soil

7.1.3 Unit weight of soil mass: bulk density, saturated density, submerged density and dry density

7.1.4 Interrelationship between specific gravity, void ratio, porosity, degree of saturation, percentage of air voids air content and density index

7.2 Soil Water Relation

7.2.1 Terzaghi's principle of effective stress

7.2.2 Darcy's law

7.2.3 Factors affecting permeability

7.3 Compaction of Soil

7.3.1 Factors affecting soil compaction\

7.3.2 Optimum moisture content

7.3.3 Relation between dry density and moisture content

7.4 Shear Strength of Soils

7.4.1 Mohr-Coulomb failure theory

7.4.2 Cohesion and angle of internal friction

7.5 Earth Pressures

7.5.1 Active and passive earth pressures

7.5.2 Lateral earth pressure theory

7.5.3 Rankine's earth pressure theory

7.6 Foundation Engineering

7.6.1 Terzaghi's general bearing capacity formulas and their application

खण्ड ख (Section-B) : ५० अङ्क

8. Structural Design

8.1 R.C. Section in Bending

8.1.1 Under reinforced, over reinforced and balanced sections

8.1.2 Analysis of single and double reinforced rectangular sections

8.2 Shear and Bond for a R.C Section

8.2.1 Shear resistance of a R.C section

8.2.2 Types of shear reinforcement and their design

8.2.3 Determination of anchorage length

8.3 Axially Loaded R.C. columns
- 8.3.1 Short and long columns
- 8.3.2 Design of a rectangular column section

8.4 Design and Drafting of R.C. Structures
- 8.4.1 Singly and doubly reinforced rectangular beams
- 8.4.2 Simple one way and two way slabs
- 8.4.3 Axially loaded short and long columns

9. Building Construction Technology

9.1 Foundations
- 9.1.1 Subsoil exploration
- 9.1.2 Type and suitability of different foundations: shallow, deep
- 9.1.3 Shoring and dewatering
- 9.1.4 Design of simple brick / stone masonry and RCC foundations

9.2 Walls
- 9.2.1 Type of walls and their functions
- 9.2.2 Choosing wall thickness, height to length relation
- 9.2.3 Use of scaffolding

9.3 Damp Proofing
- 9.3.1 Sources of dampness
- 9.3.2 Remedial measures to prevent dampness

9.4 Concrete Technology
- 9.4.1 Constituents of cement concrete
- 9.4.2 Grading of aggregates
- 9.4.3 Concrete mixes
- 9.4.4 Water cement ratio

9.5 Factors affecting strength of concrete

9.6 Form work

9.7 Curing

10. Soil and Water Engineering

10.1 Water Conveyance and Control
- 10.1.1 Design of open channels, channel linings, drop structures and spillways, water control and division structures
- 10.1.2 Design of under ground pipe conveyance system

10.2 Land Development
- 10.2.1 Land leveling-grading design methods, estimation of earthwork quantities, leveling and grading procedures, equipment for land grading and field layout

10.3 Ground Water, Irrigation Wells and Pumps
- 10.3.1 Design of wells
- 10.3.2 Wells construction procedures
- 10.3.3 Indigenous water lifting devices, positive displacement pumps, centrifugal pumps, vertical turbine pumps, submersible pumps, propeller and mixed flow pumps, selection of pumps and their performances, repaired and maintenance

10.4 Water Erosion and Control Measures
- 10.4.1 Soil losses and its measurement
- 10.4.2 Erosion control measures (engineering and bioengineering methods)
- 10.4.3 Conservation structures, watershed management and water harvesting techniques

11. Farm Structure Development

11.1 Planning of farmstead, farm residence, water supply and sanitation

11.2 Farm road, farm fencing, farm ponds, farm irrigation and drainage

11.3 Animal Shelters

11.3.1 Dairy barn (housing requirements, stanchion and loose housing barns with milking barn, pen barn)

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11.3.3 Ship and goat housing (types, housing requirements, construction material, layout

11.3.4 Swine housing (types, housing requirements, construction materials, layout

11.3.5 Aqua cultural engineering (types, pond construction)

11.4 Storage Structures

11.4.1 Fodder storage structure, feed storage structure, food grain storage structure, indigenous storage structure, bag storage structure, grain bins, and modern godowns

11.4.2 Farm machinery storage structure and farm workshop

11.5 Farm and Rural Electrification

11.5.1 Power transmission and distribution, house wiring and its components

11.5.2 AC motor (single phase and poly phase), starters, selection of electric motors, care and maintenance of electric equipments

11.6 Micro-hydro power plants

12. Estimating and Costing

12.1 General

12.1.1 Main items of work

12.1.2 Units of measurement and payment of various items of work and material

12.1.3 Standard estimate formats of government offices

12.2 Rate Analysis

12.2.1 Basic general knowledge of the use of rate analysis norms prepared by concerned Ministry and the district rates prescribed by district cordination committee

12.3 Specifications

12.3.1 Interpretation of specifications

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12.4.1 Methods of valuation

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13.1.1 Need for organization

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13.1.3 Relation between owner, contractor and engineer

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- 13.5.2 Equipment and materials schedule
- 13.5.3 Construction stages and operations
- 13.5.4 Bar chart

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14.1 Green Roads

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- 14.2.1 General
- 14.2.2 Objectives of water supply system
- 14.2.3 Source of water and its selection: gravity and artisan springs, shallow and deep wells; infiltration galleries
- 14.2.4 Gravity Water Supply System
- 14.2.5 Design period
- 14.2.6 Determination of daily water demand
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- 14.2.8 Selection of pipe
- 14.2.9 Pipe line design and hydraulic grade line

14.3 Bio engineering Measures

14.4 Renewable Energy

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द्वितीय पत्रको लागि यथासम्भव निम्नानुसार प्रश्नहरू सोधिनेछ :

द्वितीय पत्र (विषयगत)					
पत्र	विषय	खण्ड	अङ्कभार	छोटो उत्तर	लामो उत्तर
द्वितीय	सेवा सम्बन्धित कार्य-ज्ञान (Job related functional Knowledge)	**(A)**	५०	६ प्रश्न × ५ अङ्क = ३०	२ प्रश्न × १० अङ्क = २०
		(B)	५०	६ प्रश्न × ५ अङ्क = ३०	२ प्रश्न × १० अङ्क = २०