

लोक सेवा आयोग
नेपाल इन्जिनियरिङ्ग सेवा, सिभिल समूह अन्तर्गतका जनरल, हाईवे, स्थानीय, इरिगेशन, हाइड्रोपावर, हाइड्रोलोजी र एयरपोर्ट
उप-समूह, राजपत्र अनंकित प्रथम श्रेणीका पदहरूको 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	सामान्य ज्ञान र सार्वजनिक व्यवस्थापन (General Awareness & Public Management)	१००	४०	वस्तुगत (Objective)	बहुवैकल्पिक प्रश्न (MCQs)	२० प्रश्न × २ अङ्क	४५ मिनेट
	सेवा सम्बन्धित कार्य-ज्ञान (Job Based - knowledge)					३० प्रश्न × २ अङ्क	
द्वितीय	सेवा सम्बन्धित कार्य-ज्ञान (Job Based - knowledge)	१००	४०	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 /विषय	पूर्णाङ्क	उत्तीर्णाङ्क	परीक्षा प्रणाली
अन्तर्वार्ता (Interview)	३०		मौखिक (Oral)

द्रष्टव्य :

- यो पाठ्यक्रमको योजनालाई प्रथम चरण र द्वितीय चरण गरी दुई चरणमा विभाजन गरिएको छ ।
- लिखित परीक्षाको प्रश्नपत्रको माध्यम भाषा पाठ्यक्रमको विषयवस्तु जुन भाषामा दिइएको छ सोही भाषाको आधारमा नेपाली वा अंग्रेजी मध्ये कुनै एक मात्र भाषा हुनेछ । तर विषयवस्तुलाई स्पष्ट गर्नुपर्ने अवस्थामा दुवै भाषा समेत प्रयोग सकिने छ ।
- लिखित परीक्षाको माध्यम भाषा नेपाली वा अंग्रेजी अथवा नेपाली र अंग्रेजी दुवै हुनेछ ।
- प्रथम पत्र र द्वितीय पत्रको लिखित परीक्षा छुट्टाछुट्टै हुनेछ । तर एकैदिनमा परीक्षा लिइनेछ ।
- 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 ।
- वस्तुगत बहुवैकल्पिक हुने परीक्षामा परीक्षार्थीले उत्तर लेख्दा अंग्रेजी 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 ।
- बहुवैकल्पिक प्रश्न हुने परीक्षामा कुनै प्रकारको क्याल्कुलेटर (Calculator) प्रयोग गर्न पाइने छैन ।
- विषयगत प्रश्नहरूको हकमा तोकिएको अंकको एउटा लामो प्रश्न वा एउटै प्रश्नका दुई वा दुईभन्दा बढी भाग (Two or more parts of a single question) वा एउटा प्रश्न अन्तर्गत दुई वा बढी टिप्पणीहरू (Short notes) सोध्न सकिने छ ।
- विषयगत प्रश्न हुनेका हकमा प्रत्येक खण्डका लागि छुट्टाछुट्टै उत्तरपुस्तिकाहरू हुनेछन् । परीक्षार्थीले प्रत्येक खण्डका प्रश्नको उत्तर सोहीखण्डको उत्तरपुस्तिकामा लेख्नुपर्नेछ ।
- परीक्षामा सोधिने प्रश्नसंख्या, अङ्क र अङ्कभार यथासम्भव सम्बन्धित पत्र/विषयमा दिइए अनुसार हुनेछ ।

लोक सेवा आयोग

नेपाल इञ्जिनियरिङ्ग सेवा, सिभिल समूह अन्तर्गतका जनरल, हाईवे, स्यानीटरी, इरिगेशन, हाइड्रोपावर, हाइड्रोलोजी र एयरपोर्ट
उप-समूह, राजपत्र अर्न्कित प्रथम श्रेणीका पदहरूको खुला प्रतियोगितात्मक परीक्षाको पाठ्यक्रम

११. 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 पाठ्यक्रममा परेको सम्झनु पर्दछ ।
१२. प्रथम चरणको परीक्षाबाट छनोट भएका उम्मेदवारलाई मात्र द्वितीय चरणको परीक्षामा सम्मिलित गराइनेछ ।
१३. यस भन्दा अगाडि लागू भएको माथि उल्लेखित सेवा, समूहको पाठ्यक्रम खारेज गरिएको छ ।
१४. पाठ्यक्रम लागू मिति : - २०८०/१०/२२

प्रथम पत्र (Paper I) :-
सामान्य ज्ञान र सार्वजनिक व्यवस्थापन तथा सेवा सम्बन्धित कार्य-ज्ञान

भाग (Part I) :

सामान्य ज्ञान र सार्वजनिक व्यवस्थापन
(General Awareness and Public Management)

खण्ड (Section - A) : (१० प्रश्न× २ अङ्क = २० अङ्क)

1. सामान्य ज्ञान (General Awareness)

- 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 संगठन (सार्क, बिमस्टेक, आसियान र युरोपियन संघ) सम्बन्धी जानकारी
- 1.10 राष्ट्रिय र अन्तर्राष्ट्रिय महत्वका समसामयिक गतिविधिहरू

खण्ड (Section - B) : (१० प्रश्न× २ अङ्क = २० अङ्क)

2. सार्वजनिक व्यवस्थापन (Public Management)

- 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), फाइलिङ (Filing), 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, संगठन संरचना, पदपूर्ति गर्ने तरिका र प्रक्रियाहरू
 - 2.2.2 कर्मचारीको नियुक्ति, सरुवा, बढुवा, विदा, विभागीय सजाय र अवकाश
 - 2.2.3 कर्मचारीले पालन गर्नुपर्ने आचरण, नैतिक दायित्व र कर्तव्यहरू
- 2.3 संघीय मामिला तथा सामान्य प्रशासन मन्त्रालय सम्बन्धी जानकारी
- 2.4 संवैधानिक निकाय सम्बन्धी जानकारी
- 2.5 सरकारी बजेट, लेखा र लेखापरीक्षण प्रणाली सम्बन्धी सामान्य जानकारी
- 2.6 सार्वजनिक सेवा प्रवाहको अर्थ, सेवा प्रवाह गर्ने निकाय, तरिका र माध्यमहरू
- 2.7 मानव अधिकार, सुशासन र सूचनाको हक सम्बन्धी सामान्य जानकारी
- 2.8 सार्वजनिक बडापत्र (Public Charter)
- 2.9 व्यवस्थापनको अवधारणा तथा सार्वजनिक व्यवस्थापनमा निर्देशन, नियन्त्रण, समन्वय, निर्णय प्रक्रिया, उत्प्रेरणा र नेतृत्व सम्बन्धी जानकारी
- 2.10 मानवीय मूल्य मान्यता (Human Values), नागरिक कर्तव्य र दायित्व तथा अनुशासन

भाग (Part II) :-

सेवा सम्बन्धित कार्य-ज्ञान (Job Based - Knowledge)

(३० प्रश्न× २ अङ्क = ६० अङ्क)

1. Surveying

1.1 General

- 1.1.1 Classifications
- 1.1.2 Principle of surveying
- 1.1.3 Selection of suitable method
- 1.1.4 Scales, plans and maps
- 1.1.5 Entry into survey field books and level books

1.2 Levelling

- 1.2.1 Methods of levelling
- 1.2.2 Levelling instruments and accessories
- 1.2.3 Principles of levelling

1.3 Plane Tabling

- 1.3.1 Equipments required
- 1.3.2 Methods of plane tabling
- 1.3.3 Two and three point problems

1.4 Theodolite and Traverse surveying

- 1.4.1 Basic difference between different theodolites
- 1.4.2 Temporary adjustments of theodolites
- 1.4.3 Fundamental lines and desired relations
- 1.4.4 Tacheometry: stadia method
- 1.4.5 Trigonometrical levelling
- 1.4.6 Checks in closed traverse

1.5 Contouring

- 1.5.1 Characteristics of contour lines
- 1.5.2 Method of locating contours
- 1.5.3 Contour plotting

1.6 Setting Out

- 1.6.1 Small buildings
- 1.6.2 Simple curves

2. Construction Materials

2.1 Stone

- 2.1.1 Formation and availability of stones in Nepal
- 2.1.2 Methods of laying and construction with various stones

2.2 Cement

- 2.2.1 Different cements: Ingredients, properties and manufacture
- 2.2.2 Storage and transport
- 2.2.3 Admixtures

2.3 Clay and Clay Products

- 2.3.1 Brick: type, manufacture, laying, bonds

2.4 Paints and Varnishes

- 2.4.1 Type and selection
- 2.4.2 Preparation techniques
- 2.4.3 Use

2.5 Bitumen

- 2.5.1 Type

2.5.2 Selection

2.5.3 Use

3. Mechanics of Materials and Structures

3.1 Mechanics of Materials

3.1.1 Internal effects of loading

3.1.2 Ultimate strength and working stress of materials

3.2 Mechanics of Beams

3.2.1 Shear force and bending moment

3.2.2 Thrust, shear and bending moment diagrams for statically determinate beams under various types of loading

3.3 Simple Strut Theory

4. Hydraulics

4.1 General

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

4.1.2 Pressure and Pascal's law

4.2 Hydro-Kinematics and Hydro-Dynamics

4.2.1 Energy of flowing liquid: Kinetic energy, potential energy, internal energy

4.3 Measurement of Discharge

4.3.1 Weirs and notches

4.3.2 Discharge formulas

4.4 Flows

4.4.1 Characteristics of pipe flow and open channel flow

5. Soil Mechanics

5.1 General

5.1.1 Soil types and classification

5.1.2 Three phase system of soil

5.1.3 Unit Weight of soil mass: bulk density, saturated density, submerged density and dry density

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

5.2 Soil Water Relation

5.2.1 Terzaghi's principle of effective stress

5.2.2 Darcy's law

5.2.3 Factors affecting permeability

5.3 Compaction of soil

5.3.1 Factors affecting soil compaction

5.3.2 Optimum moisture content

5.3.3 Relation between dry density and moisture content

5.4 Shear Strength of Soils

5.4.1 Mohr-Coulomb failure theory

5.4.2 Cohesion and angle of internal friction

5.5 Earth Pressures

5.5.1 Active and passive earth pressures

5.5.2 Lateral earth pressure theory

5.5.3 Rankine's earth pressure theory

5.6 Foundation Engineering

5.6.1 Terzaghi's general bearing capacity formulas and their application

6. Structural Design

6.1 R.C. Sections in Bending

6.1.1 Under reinforced, over reinforced and balanced sections

6.1.2 Analysis of single and double reinforced rectangular sections

6.2 Shear and Bond for R.C. Sections

6.2.1 Shear resistance of a R.C. section

6.2.2 Types of Shear reinforcement and their design

6.2.3 Determination of anchorage length

6.3 Axially Loaded R.C. Columns

6.3.1 Short and long columns

6.3.2 Design of a rectangular column section

6.4 Design and Drafting of R.C. Structures

6.4.1 Singly and doubly reinforced rectangular beams

6.4.2 Simple one-way and two-way slabs

6.4.3 Axially loaded short and long columns

7. Building Construction Technology

7.1 Foundations

7.1.1 Subsoil exploration

7.1.2 Type and suitability of different foundations: Shallow, deep

7.1.3 Shoring and dewatering

7.1.4 Design of simple brick or stone masonry foundations

7.2 Walls

7.2.1 Type of walls and their functions

7.2.2 Choosing wall thickness, Height to length relation

7.2.3 Use of scaffolding

7.3 Damp Proofing

7.3.1 Source of Dampness

7.3.2 Remedial measures to prevent dampness

7.4 Concrete Technology

7.4.1 Constituents of cement concrete

7.4.2 Grading of aggregates

7.4.3 Concrete mixes

7.4.4 Water cement ratio

7.4.5 Factors affecting strength of concrete

7.4.6 Form work

7.4.7 Curing

7.5 Wood work

7.5.1 Frame and shutters of door and window

7.5.2 Timber construction of upper floors

7.5.3 Design and construction of stairs

7.6 Flooring and Finishing

7.6.1 Floor finishes: brick, concrete, flagstone

7.6.2 Plastering

8. Water Supply and Sanitation Engineering

8.1 General

8.1.1 Objectives of water supply system

8.1.2 Source of water and its selection: gravity and artesian springs, shallow and deep wells; infiltration galleries.

8.2 Gravity Water Supply System

8.2.1 Design period

8.2.2 Determination of daily water demand

8.2.3 Determination of storage tank capacity

8.2.4 Selection of pipe

8.2.5 Pipe line design and hydraulic grade line

8.3 Design of Sewer

8.3.1 Quantity of sanitary sewage

8.3.2 Maximum, Minimum and self cleaning velocity

8.4 Excreta Disposal and Unsewered Area

8.4.1 Pit latrine

8.4.2 Design of septic tank

9. Irrigation Engineering

9.1 General

9.1.1 Advantages and Disadvantages of irrigation

9.2 Crop Water Requirement

9.2.1 Crop season and crop water requirement for principal crops

9.2.2 Duty delta and base period

9.3 Irrigation Canals

9.3.1 Canal losses and their minimization

9.3.2 Maximum and minimum velocities

9.3.3 Design of irrigation canal section using Manning's formula

9.3.4 Need and location of weir/barrage

9.3.5 Head works for small canals

10. Highway Engineering

10.1 General

10.1.1 Introduction to transportation systems

10.1.2 Historic development of roads in Nepal

10.1.3 Classification of road in Nepal

10.1.4 Basic requirements of road alignment

10.2 Geometric Design

10.2.1 Basic design control and criteria for design

10.2.2 Elements of cross section, typical cross-section for all roads in filling and cutting

10.2.3 Camber

10.2.4 Determination of radius of horizontal curves

10.2.5 Super elevation

10.2.6 Sight distances

10.2.7 Gradient

10.2.8 Use of Nepal Road Standard and subsequent revision in road design

10.3 Drainage System

10.3.1 Importance of drainage system and requirements of a good drainage system

10.4 Road Pavement

10.4.1 Pavement structure and its components: subgrade, sub-base, base and surface courses

10.5 Road Machineries

- 10.5.1 Earth moving and compacting machines
- 10.6 Road Construction Technology
- 10.7 Bridge
 - 10.7.1 T-beam bridge
 - 10.7.2 Timber bridges
- 10.8 Road Maintenance and Repair
 - 10.8.1 Type of maintenance Works
- 10.9 Tracks and Trails

11. Estimating and Costing

- 11.1 General
 - 11.1.1 Main items of work
 - 11.1.2 Units of measurement and payment of various items of work and material
 - 11.1.3 Standard estimate formats of government offices
- 11.2 Rate Analysis
 - 11.2.1 Basic general knowledge on the use of rate analysis norms of Government of Nepal and approved district rates
- 11.3 Specifications
 - 11.3.1 Interpretation of specifications
- 11.4 Valuation
 - 11.4.1 Methods of valuation
 - 11.4.2 Basic general knowledge of standard formats used by commercial banks and NIDC for valuation

12. Construction Management

- 12.1 Organization
 - 12.1.1 Need for organization
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लोक सेवा आयोग
नेपाल इन्जिनियरिङ सेवा, सिभिल समूह अन्तर्गतका जनरल, हाईवे, स्यानीटरी, इरिगेशन, हाइड्रोपावर, हाइड्रोलोजी र एयरपोर्ट
उप-समूह, राजपत्र अनंकित प्रथम श्रेणीका पदहरूको खुला प्रतियोगितात्मक परीक्षाको पाठ्यक्रम

12.4.4 Completion report

12.5 Planning and Control

- 12.5.1 Construction schedule
- 12.5.2 Equipment and materials schedule
- 12.5.3 Construction stages and operations
- 12.5.4 Bar chart

13. Airport Engineering

13.1 General

- 13.1.1 Introduction to Air Transport System
- 13.1.2 Historic development of Airports in Nepal
- 13.1.3 Classification of Airports
- 13.1.4 Airport terminologies

13.2 Design

- 13.2.1 Basic design control and criteria for design
- 13.2.2 General items contained in ANNEX 14 (ICAO Publication)
- 13.2.3 Planning of Airport and its elements
- 13.2.4 Terminal Building and Control Tower
- 13.2.5 Drainage System
- 13.2.6 Geometric design, pavement structure and its component
- 13.2.7 Basic knowledge of Heliport and Hangers

13.3 Airport Maintenance

- 13.3.1 Types of maintenance
- 13.3.2 Methods of maintenance

प्रथम पत्रको लागि यथासम्भव निम्नानुसार प्रश्नहरू सोधिने छ ।

प्रथम पत्र (वस्तुगत)					
भाग	खण्ड	विषयवस्तु	परीक्षा प्रणाली	अङ्कभार	प्रश्न संख्या × अङ्क
I	(A)	सामान्य ज्ञान (General Awareness)	बहुवैकल्पिक प्रश्न (MCQs)	२०	१० प्रश्न × २ अङ्क = २०
	(B)	सार्वजनिक व्यवस्थापन (Public Management)		२०	१० प्रश्न × २ अङ्क = २०
II	-	सेवा सम्बन्धित कार्य-ज्ञान (Job Based -knowledge)		६०	३० प्रश्न × २ अङ्क = ६०

प्रथम पत्रको **भाग (Part II)** सेवा सम्बन्धित कार्य-ज्ञान (Job based -knowledge) को पाठ्यक्रमका इकाईबाट परीक्षामा यथासम्भव देहाय बमोजिम प्रश्नहरू सोधिने छ ।

इकाई	1	2	3	4	5	6	7	8	9	10	11	12	13
प्रश्न संख्या	3	3	3	3	2	2	2	2	2	2	2	2	2

द्वितीय पत्र (Paper II) :-
सेवा सम्बन्धित कार्य-ज्ञान (Job Based -Knowledge)
खण्ड (Section) (A) : - ५० अङ्क

1. Surveying

- 1.1 General
 - 1.1.1 Classifications
 - 1.1.2 Principle of surveying
 - 1.1.3 Selection of suitable method
 - 1.1.4 Scales, plans and maps
 - 1.1.5 Entry into survey field books and level books
- 1.2 Levelling
 - 1.2.1 Methods of levelling
 - 1.2.2 Levelling instruments and accessories
 - 1.2.3 Principles of levelling
- 1.3 Plane Tabling
 - 1.3.1 Equipments required
 - 1.3.2 Methods of plane tabling
 - 1.3.3 Two and three point problems
- 1.4 Theodolite and Traverse surveying
 - 1.4.1 Basic difference between different theodolites
 - 1.4.2 Temporary adjustments of theodolites
 - 1.4.3 Fundamental lines and desired relations
 - 1.4.4 Tacheometry: stadia method
 - 1.4.5 Trigonometrical levelling
 - 1.4.6 Checks in closed traverse
- 1.5 Contouring
 - 1.5.1 Characteristics of contour lines
 - 1.5.2 Method of locating contours
 - 1.5.3 Contour plotting
- 1.6 Setting Out
 - 1.6.1 Small buildings
 - 1.6.2 Simple curves

2. Construction Materials

- 2.1 Stone
 - 2.1.1 Formation and availability of stones in Nepal
 - 2.1.2 Methods of laying and construction with various stones
- 2.2 Cement
 - 2.2.1 Different cements: Ingredients, properties and manufacture
 - 2.2.2 Storage and transport
 - 2.2.3 Admixtures
- 2.3 Clay and Clay Products
 - 2.3.1 Brick: type, manufacture, laying, bonds
- 2.4 Paints and Varnishes
 - 2.4.1 Type and selection
 - 2.4.2 Preparation techniques
 - 2.4.3 Use
- 2.5 Bitumen
 - 2.5.1 Type

2.5.2 Selection

2.5.3 Use

3. Mechanics of Materials and Structures

3.1 Mechanics of Materials

3.1.1 Internal effects of loading

3.1.2 Ultimate strength and working stress of materials

3.2 Mechanics of Beams

3.2.1 Shear force and bending moment

3.2.2 Thrust, shear and bending moment diagrams for statically determinate beams under various types of loading

3.3 Simple Strut Theory

4. Hydraulics

4.1 General

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

4.1.2 Pressure and Pascal's law

4.2 Hydro-Kinematics and Hydro-Dynamics

4.2.1 Energy of flowing liquid: Kinetic energy, potential energy, internal energy

4.3 Measurement of Discharge

4.3.1 Weirs and notches

4.3.2 Discharge formulas

4.4 Flows

4.4.1 Characteristics of pipe flow and open channel flow

5. Soil Mechanics

5.1 General

5.1.1 Soil types and classification

5.1.2 Three phase system of soil

5.1.3 Unit Weight of soil mass: bulk density, saturated density, submerged density and dry density

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

5.2 Soil Water Relation

5.2.1 Terzaghi's principle of effective stress

5.2.2 Darcy's law

5.2.3 Factors affecting permeability

5.3 Compaction of soil

5.3.1 Factors affecting soil compaction

5.3.2 Optimum moisture content

5.3.3 Relation between dry density and moisture content

5.4 Shear Strength of Soils

5.4.1 Mohr-Coulomb failure theory

5.4.2 Cohesion and angle of internal friction

5.5 Earth Pressures

5.5.1 Active and passive earth pressures

5.5.2 Lateral earth pressure theory

5.5.3 Rankine's earth pressure theory

5.6 Foundation Engineering

5.6.1 Terzaghi's general bearing capacity formulas and their application

6. Structural Design

- 6.1 R.C. Sections in Bending
 - 6.1.1 Under reinforced, over reinforced and balanced sections
 - 6.1.2 Analysis of single and double reinforced rectangular sections
- 6.2 Shear and Bond for R.C. Sections
 - 6.2.1 Shear resistance of a R.C. section
 - 6.2.2 Types of Shear reinforcement and their design
 - 6.2.3 Determination of anchorage length
- 6.3 Axially Loaded R.C. Columns
 - 6.3.1 Short and long columns
 - 6.3.2 Design of a rectangular column section
- 6.4 Design and Drafting of R.C. Structures
 - 6.4.1 Singly and doubly reinforced rectangular beams
 - 6.4.2 Simple one-way and two-way slabs
 - 6.4.3 Axially loaded short and long columns

खण्ड (Section) (B) : - ५० अङ्क

7. Building Construction Technology

- 7.1 Foundations
 - 7.1.1 Subsoil exploration
 - 7.1.2 Type and suitability of different foundations: Shallow, deep
 - 7.1.3 Shoring and dewatering
 - 7.1.4 Design of simple brick or stone masonry foundations
- 7.2 Walls
 - 7.2.1 Type of walls and their functions
 - 7.2.2 Choosing wall thickness, Height to length relation
 - 7.2.3 Use of scaffolding
- 7.3 Damp Proofing
 - 7.3.1 Source of Dampness
 - 7.3.2 Remedial measures to prevent dampness
- 7.4 Concrete Technology
 - 7.4.1 Constituents of cement concrete
 - 7.4.2 Grading of aggregates
 - 7.4.3 Concrete mixes
 - 7.4.4 Water cement ratio
 - 7.4.5 Factors affecting strength of concrete
 - 7.4.6 Form work
 - 7.4.7 Curing
- 7.5 Wood work
 - 7.5.1 Frame and shutters of door and window
 - 7.5.2 Timber construction of upper floors
 - 7.5.3 Design and construction of stairs
- 7.6 Flooring and Finishing
 - 7.6.1 Floor finishes: brick, concrete, flagstone
 - 7.6.2 Plastering

8. Water Supply and Sanitation Engineering

8.1 General

8.1.1 Objectives of water supply system

8.1.2 Source of water and its selection: gravity and artesian springs, shallow and deep wells; infiltration galleries.

8.2 Gravity Water Supply System

8.2.1 Design period

8.2.2 Determination of daily water demand

8.2.3 Determination of storage tank capacity

8.2.4 Selection of pipe

8.2.5 Pipe line design and hydraulic grade line

8.3 Design of Sewer

8.3.1 Quantity of sanitary sewage

8.3.2 Maximum, Minimum and self cleaning velocity

8.4 Excreta Disposal and Unsewered Area

8.4.1 Pit latrine

8.4.2 Design of septic tank

9. Irrigation Engineering

9.1 General

9.1.1 Advantages and Disadvantages of irrigation

9.2 Crop Water Requirement

9.2.1 Crop season and crop water requirement for principal crops

9.2.2 Duty delta and base period

9.3 Irrigation Canals

9.3.1 Canal losses and their minimization

9.3.2 Maximum and minimum velocities

9.3.3 Design of irrigation canal section using Manning's formula

9.3.4 Need and location of weir/barrage

9.3.5 Head works for small canals

10. Highway Engineering

10.1 General

10.1.1 Introduction to transportation systems

10.1.2 Historic development of roads in Nepal

10.1.3 Classification of road in Nepal

10.1.4 Basic requirements of road alignment

10.2 Geometric Design

10.2.1 Basic design control and criteria for design

10.2.2 Elements of cross section, typical cross-section for all roads in filling and cutting

10.2.3 Camber

10.2.4 Determination of radius of horizontal curves

10.2.5 Super elevation

10.2.6 Sight distances

10.2.7 Gradient

10.2.8 Use of Nepal Road Standard and subsequent revision in road design

10.3 Drainage System

10.3.1 Importance of drainage system and requirements of a good drainage system

10.4 Road Pavement

- 10.4.1 Pavement structure and its components: subgrade, sub-base, base and surface courses
- 10.5 Road Machineries
 - 10.5.1 Earth moving and compacting machines
- 10.6 Road Construction Technology
- 10.7 Bridge
 - 10.7.1 T-beam bridge
 - 10.7.2 Timber bridges
- 10.8 Road Maintenance and Repair
 - 10.8.1 Type of maintenance Works
- 10.9 Tracks and Trails

11. Estimating and Costing

- 11.1 General
 - 11.1.1 Main items of work
 - 11.1.2 Units of measurement and payment of various items of work and material
 - 11.1.3 Standard estimate formats of government offices
- 11.2 Rate Analysis
 - 11.2.1 Basic general knowledge on the use of rate analysis norms of Government of Nepal and approved district rates
- 11.3 Specifications
 - 11.3.1 Interpretation of specifications
- 11.4 Valuation
 - 11.4.1 Methods of valuation
 - 11.4.2 Basic general knowledge of standard formats used by commercial banks and NIDC for valuation

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द्वितीय पत्र (विषयगत)					
पत्र	विषय	खण्ड	अङ्कभार	छोटो उत्तर	लामो उत्तर
द्वितीय	सेवा सम्बन्धित कार्य-ज्ञान (Job Based-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