<u>परिशिष्टः-४</u> (दफा-५.(५) सँग सम्बन्धित) प्राविधिक सहायकको पाठ्यकम

(क) सेवा सम्बन्धी

खण्ड-१:- प्रशासनिक कार्य सम्बन्धी

- रोजगारीको हकसम्बन्धी ऐन, २०७५ र रोजगारीको हकसम्बन्धी नियमावली, २०७५,
- प्रधानमन्त्री रोजगार कार्यक्रम संचालन निर्देशिका, २०७४, कामका लागि पारिश्रमिकमा आधारित सामूदायिक आयोजना सञ्चालन तथा व्यवस्थापन कार्यविधी, २०७६ र युवा रोजगारीका लागि रुपान्तरण पहल आयोजना (संचालन तथा व्यवस्थापन) कार्यबिधि, २०७६,
- ३. कामका लागि पारिश्रमिक (Cash for Work) को अवधारणा,
- ४. स्थानीय तहको बजेट तर्जुमा प्रकृया, खर्च व्यवस्थापन र लेखा परीक्षण तथा गुनासो व्यवस्थापन,
- ४. सामाजिक परिचालन, सार्वजनिक सुनुवाई, सामाजिक लेखापरीक्षण तथा गुनासो व्यवस्थापन, र
- ६. आचरण तथा अनुशासन र सुशासन।

खण्ड-२:- प्राविधिक कार्य सम्बन्धी

• स्थानीय सेवाको इन्जिनियरिङ् सेवा, सिभिल समूह पाँचौ तह सब-इन्जिनियर पदको लोकसेवा आयोगले निर्धारण गरेको देहाय बमोजिमको पाठ्यक्रमका विषयवस्तुहरुः

1. Surveying

- 1.1 General
 - 1.1.1 Principle and types of surveying
 - 1.1.2 Units, scales and maps
 - 1.1.3 Field books and Level books
- 1.2 Levelling
 - 1.2.1 Principles and methods of levelling
 - 1.2.2 Levelling instruments and accessories
- 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: Small buildings and 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: Type and selection; preparation techniques and use
- 2.5 Bitumen: Type, selection and 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 Relation between shear force and bending moment
 - 3.2.2 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: elevation energy, 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: 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. Structures

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 Design and Working System 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 and thickness of walls
- 7.2.2 Use of scaffolding
- 7.3 Damp Proofing
 - 7.3.1 Source of Dampness
 - 7.3.2 Remedial measures for damp proofing
- 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 artisan 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 Need for irrigation; advantages of irrigation
- 9.1.2 Sources of irrigation: water, river & streams, ground water and others
- 9.1.3 Methods of irrigation: surface, sub-surface and others
- 9.2 Irrigation Water Requirement
 - 9.2.1 Crop season, principal crops, and crop water requirements
 - 9.2.2 Base period & duty
- 9.3 Irrigation Canals
 - 9.3.1 Canal losses and their minimization
 - 9.3.2 Irrigation requirements and design discharge of canal permissible velocities for different canals
 - 9.3.3 Design of canal based on Manning's & Lacey's formulae
 - 9.3.4 Need and location of escapes
 - 9.3.5 Components of distribution system

10. Highway Engineering

- 10.1 General
 - 10.1.1 Introduction to transportation systems
 - 10.1.2 Historic development of roads
 - 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 Superlevation
- 10.2.6 Sight distances
- 10.2.7 Gradient
- 10.2.8 Use of Nepal Road Standardand subsequent revision in road design

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10.3 Drainage System

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

- 10.4 Road Pavement: 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: T-beam bride and Timber bridges
- 10.8 Road Maintenance and Repair: Type of maintenance works
- 10.9 Tracks and Trails
- 10.10 Airport Engineering: Planning and layout of Heliports; Terminal Building and Control Tower; Drainage System for Airports

11.EstimatingandCosting

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 prepared by Ministry of Works and Transport and the district rates prescribed by district development committee
- 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

12.1.2 Responsibilities of a civil Sub- engineer

12.1.3 Relation between Owner, Contractor and Engineer

- 12.2 Site Management
 - 12.2.1 Preparation of site plan
 - 12.2.2 Organizing labor
 - 12.2.3 Measures to improve labor efficiency
 - 12.2.4 Accident prevention
- 12.3 Procurement and Contract Procedure
 - 12.3.1 Contracts and its types
 - 12.3.2 Departmental works and day-work
 - 12.3.3 Preparation of tender document
 - 12.3.4 Tender procedure
 - 12.3.5 Contract agreement
 - 12.3.6 Conditions of contract
 - 12.3.7 Construction supervision
- 12.4 Accounts
 - 12.4.1 Administrative approval and technical sanction
 - 12.4.2 Familiarity with standard account keeping formats used in governmental organizations
 - 12.4.3 Muster roll
 - 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
- (ख) कम्प्युटर सम्बन्धी
 - 1. Computer fundamental
 - 2. Operating System
 - 3. Word processing
 - 4. Electronic spreadsheet
 - 5. Database management system
 - 6. Presentation system

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