

## अनुसूची -५

(दफा ७(२) सँग सम्बन्धित)

प्राविधिक सहायकको पाठ्यक्रम

### खण्ड- १ सेवा सम्बन्धी

क) प्रशासन सम्बन्धी -१० अंक

समय: १ घण्टा

१. प्रधानमन्त्री रोजगार कार्यक्रम संचालन निर्देशिका, २०७५, कामका लागि पारिश्रमिकमा आधारित सामूदायिक आयोजना सञ्चालन तथा व्यवस्थापन कार्यविधि, २०७६ र युवा रोजगारीका लागि रुपान्तरण पहल आयोजना (संचालन तथा व्यवस्थापन) कार्यविधि, २०७६,
२. कामका लागि पारिश्रमिक (Cash for Work) को अवधारणा,
३. सामाजिक परिचालन, सार्वजनिक सुनुवाई, सामाजिक लेखापरीक्षण तथा गुनासो व्यवस्थापन ,
४. स्थानीय तहको बजेट तर्जुमा प्रकृया, खर्च व्यवस्थापन र लेखा परीक्षण,
५. आचरण तथा अनुशासन र सुशासन।

ख) प्राविधिक कार्य सम्बन्धी परीक्षा- ४० अंक

#### 1. Surveying

##### 1.1 Levelling

1.1.1 Principles and methods of levelling

1.1.2 Levelling instruments and accessories

##### 1.2 Plane Tabling

1.2.1 Equipments required

1.2.2 Methods of plane tabling

1.2.3 Two and three point problems

#### 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
- 5.4 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

## 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 section

### 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 Classification of road in Nepal

10.1.2 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: 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 Road Maintenance and Repair: 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 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 Site Management
  - 12.1.1 Preparation of site plan
  - 12.1.2 Organizing labor
  - 12.1.3 Measures to improve labor efficiency
  - 12.1.4 Accident prevention

## 12.2 Procurement and Contract Procedure

- 12.2.1 Contracts and its types
- 12.2.2 Departmental works and day-work
- 12.2.3 Preparation of tender document
- 12.2.4 Tender procedure
- 12.2.5 Contract agreement
- 12.2.6 Conditions of contract
- 12.2.7 Construction supervision

## 12.3 Planning and Control

- 12.3.1 Construction schedule
- 12.3.2 Equipment and materials schedule
- 12.3.3 Construction stages and operations

खण्ड-२: कम्प्युटर सम्बन्धी प्रयोगात्मक परीक्षा -५० अङ्क

समय: ३० मिनेट

1. Computer fundamental
2. Operating System
3. Word processing
4. Electronic spreadsheet
5. Database management system
6. Presentation system
7. Internet Browsing & Website Management.