नेपाल सरकार

शिक्षक सेवा आयोग

माध्यमिक तह (कक्षा ९-१२) को शिक्षक अध्यापन अनुमतिपत्रको लिखित परीक्षा पाठ्यक्रम, २०७५

पहिलो पत्र : Civil Engineering 65 Marks

Introduction

This course consists of basic knowledge about Civil engineering. It deals with the Surveying, estimating, construction technology, highway, water supply and building design. It is focused on the different type of survey, methodology, and construction technology of building and other civil work construction. It gives concept of the building drawing techniques and estimating of different civil work.

Objectives

- Acquire basic knowledge and skills related to Civil engineering concept.
- Gain knowledge about the Surveying, Material, soil mechanics, Building Construction, water supply and Irrigation, Highway and Rcc Design.
- Know who to read different Construction Drawing.
- Identify the different types of water supply and irrigation problem.

Part : I **40 Marks**

1. Building Construction and Drawing
   - 1.1 Building Component :
     - Staircase, door/window, roof, ceiling.
   - 1.2 Temporary construction
     - Formwork, Scaffolding.
   - 1.3 Wall, Dampness, Mixing of Concrete.
   - 1.4 Building Forms for Earthquake Resistance.
   - 1.5 Foundation
     - Subsoil, shallow and deep foundation.
   - 1.6 Walls opening.
   - 1.7 Drawing Commands, Unit setup, Features, Plotting Drawing.
   - 1.8 Starting a new drawing and opening existing drawing.
   - 1.9 Scaling in drawing, Geometrical Construction, Orthographic Projection, Land Measurement.
2. Water supply and Irrigation
   - 2.1 Source of water, Demand of water, Quality of water, Treatment of water, Method of Distribution of water valves and fitting.
   - 2.2 Types of sewers, land treatment of sewage disposal, self-Purification, Pit, VIP latrine, 4R Principle, onsite management.
   - 2.3 Factor affecting Duty, Method of irrigation, head work, Cross Drainage work, Introduction of water logged.
   - 2.4 Primary and Secondary Power, General layout of HP Project.
   - 2.5 Introduction of hydraulic turbine.
   - 2.6 Load factor, utilization factor and capacity factor
3. Construction Technology and workshop
   - 3.1 Materials
     - Stone, Cement, Clay, Bitumen.
   - 3.2 Brick and stone Masonry.

3.3 Paint and Varnishes
- Type and selection
- Preparation techniques.
- Use

3.4 Carpenter
- Duty and scope of Carpenter.

3.5 Cross section of wood.
3.6 Methods of conversion
- Through and through sawn
- Tangential sawn
- Rift or quarter sawn

3.7 Air seasoning/Natural seasoning, kiln/Artificial seasoning.
3.8 Defect of timber.
3.9 Construction of mortise and tenon.

4. Highway Engineering

5.1 Introduction
- Transportation system
- Historic development
- Classification of road
- Basic requirement of road alignment.

5.2 Geometric design
- Traffic volume, intensity, lane, slip friction
- Typical cross section in cutting and filling-definition of its elements
- Camber, super elevation, extra-widening
- Sight distance- definition and types

5.3 Highway Drainage
- Drainage system and its importance
- Requirement of good drainage system

5.4 Road pavement
- Types of pavement- Flexible and Rigid pavement definition.
- General structure of pavement- sub grade, sub base, base and surface courses uses.

5.5 Road machine
- Earth moving and compacting machine.

5.6 Road construction technology
- Earthen, Gravel, WBM
- Important and special consideration of hill Road.
- NRS and Feeder road Guidelines.

5. Engineering Surveying

5.7 Introduction
- Defination, objective, uses classification, principal,.
- Scale

5.8 Levelling
- Method of levelling
- Levelling instrument and accessories.
- Principal of Levelling

5.9 Plane table survey
- Equipment required
- Method of plane table
- Two and three point problems

5.10 Chain surveying
- Principles of chain surveying
- Suitability and unsuitability.

5.11 Compass survey
- Principle
- Types of traverse, type of compass.
- Whole circle and quadrantal bearing system.

5.12 Theodolite
- Uses, Temporary adjustment of theodolite.
- Method of measuring horizontal angle

5.13 Contouring
- Characterisrics of contour lines
- Method of location contours
- Contour plotting.

6. Estimating, costing and Supervision.

6.1 Introduction
- Main items of work
- Units of measurement and payment of various items of work and material
- Standard estimate formats of government offices

6.2 Rate Analysis
- 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

6.3 Specifications
- Interpretation of specification

6.4 Valuation
- Methods of valuation
- Basic general knowledge of standard formats used by commercial banks and NIDC for valuation

7. Geo- Technical Engineering

7.1 Introduction
- Soil types and classification
- Three phase system of soil
- Unit Weight of soil mass:bulk density, saturated density, submerged density and dry density

7.2 Soil Water Relation
- Terzaghi's principle of effective stress
- Darcy's law
- Factor affecting permeability

7.3 Compaction of soil
- Factor affecting compaction of Soil
- Optimum moisture content

- Relation between dry density and moisture content

7.4 Shear Strength of Soil
- Mohr-Coulomb failure theory
- Cohesion and angle of internal friction

7.5 Earth Pressures
- Active and passive earth pressures
- Lateral earth pressure theory
- Rankine's earth pressure theory

7.6 Foundation Engineering
- Terzaghi's general bearing capacity formulas and their application

8. RCC Structure

8.1 Introduction
- Sections in bending
- Under reinforced, over reinforced and balanced sections
- Analysis of single and double reinforced rectangular sections

8.2 Shear and Bond for R.C Sections
- Shear resistance of a R.C section
- Types of Shear reinforcement and their design
- Determination of anchorage length

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

8.4 Design and Drafting of R.C Structures
- Singly and doubly reinforced rectangular beam
- Simple one-way and two-way slabs
- Axially loaded short and long column

Part : II **25 Marks**

9. Curriculum Related Knowledge (5 marks)
- Space of relevant subject in Civil Engineering in secondary school curriculum.
- Breadth/Depth of the content
- Knowledge of competences and learning outcomes
- Resource materials of relevant subjects of Civil engineering in secondary level.

10. Classroom Teaching Skills (5 marks)
- Class room management skills
- Effective Presentation Skills/Exposition
- Problem Based Learning Strategies
- Small Group Discussion/Whole Class
- 'Observation' as an instructional strategy

11. Use of 'Projects' and 'Field Works' in Instruction (5 marks)
- Designing projects
- Implementing and Communicating
    i. Reporting/Presentation
    ii. Exhibition

12. Assessment in teaching (5 marks)

- Knowledge of assessment plan and specification grid in school curriculum
- Developing test and appropriate tools for student assessment.
- Authentic assessment to measure performance.
  (Use of rubrics)

13. Use of ICT (5 marks)

- ICT as CPD (Information retrieve/ search/ manage, knowledge of ICT competences)
- ICT as content enhancement (Use of various ICT tools to explore different topics of engineering and terminologies)
- ICT as delivery tool (Mobile, Multimedia software, online materials, games in classroom for specific contents)

Marks distribution and Grid

Units	Mark Distribution						Total Qs	Total Marks
	Objective Question			Subjective Question				
	No.of Q.	Marks	Total	No.of Q.	Marks	Total		
1. Building Construction and Drawing	6	1	6	-	-	6	6	6
2. Water supply and Irrigation	4	1	4	-	-	4	4	4
3 Construction Technology and workshop	5	1	5	-	-	5	5	5
4 Highway Engineering	4	1	4	-	-	4	4	4
5 Engineering Surveying	6	1	6	-	-	6	6	6
6 Estimating, costing and Supervision.	6	1	6	-	-	6	6	6
7 Geo- Technical Engineering	4	1	4	-	-	4	4	4
8 RCC Structure	5	1	5	-	-	5	5	5
9 Curriculum Related Knowledge	-	-	-	1	5	5	1	5
10 Classroom Teaching Skills	-	-	-	1	5	5	1	5
11 Use of ‘Projects’ and ‘Field Works’ in Instruction	-	-	-	1	5	5	1	5
12 Assessment in teaching	-	-	-	1	5	5	1	5
13 Use of ICT	-	-	-	1	5	5	1	5
Total	40	1	40	5	5	25	45	65

द्रष्टव्य :

१. प्रश्न पत्र तयार गर्दा संज्ञानात्मक तहका सबैजसो क्षेत्र समेटिने छन् ।
२. विषयगत प्रश्नहरूमार्फत सिर्जनशीलता र शिक्षणसँग सम्बन्धित व्यावहारिक पक्षहरू मापन गर्ने उद्देश्य राखिने छ ।
३. कण्ठस्थ गरी दिइएका जवाफभन्दा शिक्षण सिकाइसँग सम्बन्धित व्यावहारिक पक्षहरूको विश्लेषण/विवेचना तथा समस्याको समाधान गर्दै दिइएका मौलिक तथा सिर्जनात्मक उत्तरलाई प्रोत्साहित गरिने छ ।
४. खण्ड (ख) अन्तर्गतका शिक्षणकलासँग सम्बन्धित प्रश्नहरु खण्ड (क) मा दिइएका विषयहरुको व्यवहारिक पक्षसँग जोडेर तयार गरिने छन् ।
५. लामो उत्तर आउने प्रश्नहरु शिक्षणमा सूचना प्रविधिको प्रयोगलाई समेत ध्यान दिइने छ ।