अनुसूची-४

सीमाक्षेत्र विकास कार्यक्रम

लिखित परीक्षाको पाठ्यक्रम

जिल्ला तह

पद : **सिभिल इन्जिनियर**

शैक्षिक योग्यता : सिभिल इन्जिनियर स्नातक तह उतीर्ण ।

1. Structure Analysis and Design **15%**

1.1 Stresses and strains; theory of torsion and flexure; moment of inertia

1.2 Analysis of beams and frames: Bending moment, shear force and deflection of beams and frames: determinate structure - Energy methods; three hinged systems, indeterminate structures- slope deflection method and moment distribution method; use of influence line diagrams for simple beams, unit load method

1.3 Reinforced concrete structures: Difference between working stress and limit state philosophy, analysis of RC beams and slabs in bending, shear, deflection, bond and end anchorage, Design of axially loaded columns; isolated and combined footings, introduction to pre-stressed concrete

1.4 Steel and timber structures: Standard and built-up sections: Design of riveted, bolted and welded connections, design of simple elements such as ties, struts, axially loaded and eccentric columns, column bases, Design principles on timber beams and columns

2. Construction Materials **10%**

2.1 Properties of building materials: physical, chemical, constituents, thermal etc.

2.2 Stones-characteristics and requirements of stones as a building materials 2.3Ceramic materials: ceramic tiles, Mosaic Tile, brick types and testing etc.

2.4 Cementing materials: types and properties of lime and cement; cement mortar tests

2.5 Metals: Steel; types and properties; Alloys

2.6 Timber and wood: timber trees in Nepal, types and properties of wood

2.7 Miscellaneous materials: Asphaltic materials (Asphalt, Bitumen and Tar); paints and varnishes; polymers

2.8 Soil properties and its parameters

3. Concrete Technology **7%**

3.1 Constituents and properties of concrete (physical and chemical)

3.2 Water cement ratio

3.3 Grade and strength of concrete, concrete mix design, testing of concrete

3.4 Mixing, transportation pouring and curing of concrete

3.5 Admixtures

3.6 High strength concrete

3.7 Pre-stressed concrete technology

4. Construction Management
12%

4.1 Construction scheduling and planning: network techniques (CPM, PERT) and bar charts

4.2 Contractual procedure and management: types of contract, tender and tender notice, preparation of bidding (tender) document, contractors pre-qualification, evaluation of tenders and selection of contractor, contract acceptance, condition of contract; quotation and direct order, classifications of contractors; dispute resolution; muster roll

4.3 Material management: procurement procedures and materials handling

4.4 Cost control and quality control

4.5 Project maintenance

4.6 Occupational health and safety

4.7 Project monitoring and evaluation

4.8 Quality assurance plan

4.9 Variation, alteration and omissions

5. Estimating and Costing Valuation and Specification 10%

5.1 Types of estimates and their specific uses

5.2 Methods of calculating quantities

5.3 Key components of estimating norms and rate analysis

5.4 Preparation of bill of quantities

5.5 Purpose, types and importance of specification

5.6 Purpose, principles and methods of valuation

6. Drawing Techniques 10%

6.1 Drawing sheet composition and its essential components

6.2 Suitable scales, site plans, preliminary drawings, working drawings etc

6.3 Theory of projection drawing: perspective, orthographic and axonometric projection; first and third angle projection

6.4 Drafting tools and equipments

6.5 Drafting conventions and symbols

6.6 Topographic, electrical, plumbing and structural drawings

6.7 Techniques of free hand drawing

7. Engineering Survey 8%

7.1 Introduction and basic principles

7.2 Linear measurements: techniques; chain, tape, ranging rods and arrows; representation of measurement and common scales; sources of errors; effect of slope and slope correction; correction for chain and tape measurements; Abney level and clinometers

7.3 Compass and plane table surveying: bearings; types of compass; problems and sources of errors of compass survey; principles and methods of plane tabling

7.4 Leveling and contouring: Principle of leveling; temporary and permanent adjustment of level; bench marks; booking methods and their reductions; longitudinal and cross sectioning; reciprocal leveling; trigonometric leveling; contour interval and characteristics of contours; methods of contouring

7.5 Theodolite traversing: need of traverse and its significance; computation of coordinates; adjustment of closed traverse; closing errors

7.6 Uses of Total Station and Electronic Distance Measuring Instruments

8. Engineering Economics 8%

8.1 Benefit cost analysis, cost classification, sensitivity analysis, internal rate of return, time value of money; economic equilibrium, demand, supply and production, net present value, financial and economic evaluation

9. Professional Practices 5%

9.1 Ethics and professionalism: code of conduct and guidelines for professional engineering practices

9.2 Nepal Engineering Council Act, 2055 and regulations, 2056

9.3 Relation with clients, contractor and fellow professionals

9.4 Public procurement practices for works, goods and services and its importance.

10. Monitoring and Evaluation 15%

10.1 Concept of Monitoring and Evaluation

10.2 Indicator of Monitoring and Evaluation /

10.3 Concept and Application of Logical Framework

10.4 Method of Evaluation (Desk Monitoring, Third Party Monitoring, etc.)

10.5 Monitoring and Evaluation report, analysis and feedback as per National Planning Commission Guidelines.

10.6 Impact Evaluation

10.7 Government's Budget Planning and Budget Decision Process

10.8 Local Self-Governance Act and Regulation

10.9 Border Area Development Operation Guideline, 2072 (with amendments)

10.10 Web Based Reporting System (WBRS) of Ministry of Federal Affairs and Local Development

सीमाक्षेत्र विकास कार्यक्रम

लिखित परीक्षाको पाठ्यक्रम

जिल्ला तह

पद : सिभिल सव–इञ्जिनियर

शैक्षिक योग्यता : डिप्लोमा इन सिभिल इन्जिनियरिङ्ग उतीर्ण ।

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 palne 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
2.3.1 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 Relation between 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: 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
4.4.1Characteristics 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
7.1.4 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 pr-went 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 artisan springs, shallow and deep wells; infiltration galleries.
8.2 Gravity Water Supply System
8.2.1Design 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 Water Requirement
9.2.1 Crop season and principal crops
9.2.2 Base period
9.3 Flow 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 based on manning's formula
9.3.4 Need and location of spillways
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
10.1.3 Classification of road in Nepal
10.1.4 Basic requirements of road alignment
10.2Geometric 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 Standard,2027(First Revision 2045) and subsequent revision in road design
10.3Drainage 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
10.6Road Construction Technology
10.7 Bridge
10.7.1 T-beam bride
10.7.2 Timber bridges
10.8Road 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 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 overseer
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 Contract Procedure
12.3.1 Contracts
12.3.2 Departmental works and day-work
12.3.3 Types of contracts
12.3.4 Tender and tender notice
12.3.5 Earnest money and security deposit

12.3.6 Preparation before inviting tender
12.3.7 Agreement
12.3.8 Conditions of contract
12.3.9 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

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

14. Monitoring and Evulation **10%**

14.1 Concept of Monitoring and Evaluation
14.2 Indicator of Monitoring and Evaluation
14.3 Monitoring and Evaulation report, analysis and feedback
14.4 Impact Evaluation
14.5 Govenment's Budget Planning and Budget Decision Process
14.6 Local Self-Governande Act and Regulation
14.7 Border Area Development Program Operation Guideline, 2072 (with amendments)

सीमाक्षेत्र विकास कार्यक्रम

लिखित परीक्षाको पाठ्यक्रम

जिल्ला तह

पद : कार्यालय तथा लेखा सहायक (सहायक पाँचौ सरह)को पाठ्यक्रम

शैक्षिक योग्यता : मान्यता प्राप्त शैक्षिक संस्थाबाट प्रविणता प्रमाणपत्र तह वा सो सरह उत्तीर्ण

क. कार्यालय व्यवस्थापन र लेखा प्रणाली

- दर्ता, चलानी, फाइलिङ, पञ्जिकरण
- संगठन, पदसोपान, अधिकार प्रत्यायोजन सम्वन्धी जानकारी
- कार्यालय र कार्यालय व्यवस्थापनको अवधारणा र महत्व
- अभिलेख व्यवस्थापनको परिचय, उद्देश्य, आवश्यकता र महत्व
- कार्यालयमा संचारको महत्व, प्रकार, माध्यम
- कार्यालयमा व्यवस्थापन सूचना प्रणाली (MIS) को आवश्यकता र महत्व

ख. लेखा प्रणाली र राजस्व प्रशासन

- सरकारी लेखा प्रणाली र लेखापरीक्षण सम्वन्धी जानकारी
- सरकारको आर्थिक कार्य प्रणालीको सामान्य जानकारी
- नेपाल सरकारको दोहोरो स्रेस्ता र प्रणाली सम्वन्धी जानकारी
- जिन्सी स्रेस्ता प्रणाली र धरौटी स्रेस्ता प्रणाली
- बजेट तर्जुमा, बजेट विनियोजन तथा प्रगतिको ढाँचा सम्वन्धी जानकारी

ग. सार्वजनिक सेवा प्रवाह

- अर्थ र महत्व
- सार्वजनिक सेवा प्रवाह गर्ने तरिका/ माध्यमहरु
- सार्वजनिक सेवा प्रवाहमा सेवा प्रदायकको भूमिका र सेवाग्राहीको अधिकार तथा दायित्व ।
- उपभोक्ता समितिको गठन, संचालन र व्यवस्थापन सम्वन्धी जानकारी
- योजना तर्जुमा, कार्यान्वयन, अनुगमन मूल्यांकन र राष्ट्रिय योजना आयोगबाट निर्धारित ढाँचा बमोजिमको प्रगति विवरण सम्वन्धी जानकारी

घ. संविधान, ऐन नियम, कार्यविधि

- नेपालको संविधान
- निजामति सेवा ऐन,२०४९ र नियमावली,२०४९ को आचरण र अनुशासन सम्वन्धी व्यवस्थाहरु
- खरीद ऐन, २०६३ तथा स्थानीय निकाय (आर्थिक प्रशासन) नियमावली, २०६४
- स्थानीय निकाय स्रोत परिचालन कार्यविधि, २०६७
- स्थानीय शासन ऐन,२०५४ नियमावली २०५५ (योजना तर्जुमा प्रक्रियासँग सम्वन्धित)
- सीमाक्षेत्र विकास कार्यक्रम संचालन कार्यविधि, २०७२ (संशोधन सहित)