

सीमाक्षेत्र विकास कार्यक्रम
लिखित परीक्षाको पाठ्यक्रम
जिल्ला तह

पद : सिभिल इन्जिनियर
शैक्षिक योग्यता : सिभिल इन्जिनियर स्नातक तह उत्तीर्ण ।

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 2.3 Ceramic 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%

अनुसूची-४

- 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

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जिल्ला तह

पद : सिभिल सव-इन्जिनियर
शैक्षिक योग्यता : डिप्लोमा इन सिभिल इन्जिनियरिङ्ग उत्तीर्ण ।

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
- 2.3.1 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
 - 4.4.1 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
 - 7.1.4 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 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 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

10.2 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 Standard,2027(First Revision 2045) 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 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 Evaluation

10%

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

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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 सम्बन्धी 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 सम्बन्धी जानकारी
- सरकारको आर्थिक कार्य प्रणालीको सामान्य जानकारी
- नेपाल सरकारको दोहोरो सेस्ता र प्रणाली सम्बन्धी जानकारी
- जिन्सी सेस्ता प्रणाली र धरौटी सेस्ता प्रणाली
- बजेट तर्जुमा, बजेट विनियोजन तथा प्रगतिको ढाँचा सम्बन्धी जानकारी

ग. सार्वजनिक सेवा प्रवाह

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

घ. संविधान, ऐन नियम, कार्यविधि

- नेपालको संविधान
- निजामति सेवा ऐन, २०४९ र नियमावली, २०४९ को आचरण र अनुशासन सम्बन्धी व्यवस्थाहरू
- 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 सम्बन्धित)
- सीमाक्षेत्र विकास कार्यक्रम संचालन कार्यविधि, २०७२ (संशोधन सहित)