

Diploma Civil Engineering

Vth Semester Syllabus

Subject Code	Subject Name
DCE501	Transportation Engineering-II
DCE502	Structural Design and Drafting-I / RCC
DCE503	Irrigation and Hydraulic Structures
DCE504	Soil Mechanics/ Geotechnical Engineering
DCE505	Quantity Surveying and Costing
DCE506	Minor Project

Diploma Civil Engineering
Vth Semester Syllabus

DCE 501 Transportation Engineering - II

Subject Code	DCE 401			
Subject Name	Hydrology			
Max. Marks	100			
	L	T	P	TC
	3	1	-	4

COURSE OUTCOMES(COs):

After Completing the course student should be able to:

CO-1	Explain the importance of different transportation modes and identify railway track components.
CO-2	Apply principles of geometric design, station planning, and signaling in railway systems.
CO-3	Analyze bridge site conditions, design data, and determine suitable bridge types.
CO-4	Evaluate different types of bridge foundations and construction techniques.
CO-5	Design tunnel alignment, construction methods, and apply drainage and ventilation techniques.

COURSE CONTENTS:

UNIT-I:

Permanent way transportation by Roads, railways, Airways, Waterways, their importance and limitations, Rails: types, gauges welding of rails, wear and tear of rails, rail creep., Sleepers: types and comparison, requirement of a good sleeper, sleeper density. Rail fastenings: types, Fish plates, fish bolts, spikes, bearing plates, chain keys, check and guard rails.

UNIT-II :

Geometric Design ; Station & Yards; Points and Crossings & Signaling and interlocking : Formation, cross sections, Super elevation, Equilibrium, Cant and cant deficiency, Types of signals in stations and yards, principles of signaling and inter-locking.

UNIT-III

Bridge Site Investigation; Loading Standards & Component parts: Selection of site, alignment, collection of bridge design data: essential surveys, hydraulic design, scour depth of bridge foundation, Economical span, clearance, afflux, type of road & railway bridges

UNIT-IV:

Bridge Foundations, Different types of foundation: piles and wells, sinking of wells, cofferdams. Choice of bridges and choice of materials, details of construction underwater and above water, sheet piles coffer dams,

UNIT-V:

Tunnels: 1. Selection of route, Engineering surveys, alignment, shape and size of tunnel, bridge action, pressure relief phenomenon, Tunnel approaches, Shafts, pilot shafts. Construction of tunnels in soft soil, hard soil and rock. Mucking operation, Drainage and ventilation.

Reference Books:-

1. Chakraborty and Das; Principles of transportation engineering; PHI
2. Rangwala SC; Railway Engineering; Charotar Publication House, Anand
3. Rangwala SC; Bridge Engineering; Charotar Publication House, Anand
4. Ponnuswamy; Bridge Engineering; TMH
5. Railway Engineering by Arora & Saxena - Dhanpat Rai & Sons
6. Railway Track by K.F. Antia
7. Principles and Practice of Bridge Engineering S.P. Bindra - Dhanpat Rai & Sons
8. Bridge Engineering - J.S. Alagia - Charotar Publication House, Anand
9. Railway, Bridges & Tunnels by Dr. S.C. Saxena
10. Harbour, Docks & Tunnel Engineering - R. Srinivasan
11. Essentials of Bridge Engg. By I.J. Victor; Relevant IS & IRS codes

Diploma Civil Engineering Vth Semester Syllabus

DCE 502 Structural Design and Drawing -1/ RCC

Subject Code	DCE 502			
Subject Name	Structural Design and Drawing -1/ RCC			
Max. Marks	150			
	L	T	P	TC
	3	1	2	6

COURSE OUTCOMES(COs):

After Completing the course student should be able to:

CO-1	Explain fundamental structural design principles, load transfer mechanisms, material properties, and load calculations using WSM and LSM
CO-2	Design singly/doubly reinforced, flanged, continuous, and cantilever beams for flexure, shear, and bond as per codal provisions
CO-3	Analyze and design one-way, two-way, circular, cantilever, and continuous slabs following standard design guidelines
CO-4	valuate and design short/long columns under axial load and bending, and design isolated, combined, strap, and raft foundations.
CO-5	Design various types of staircases including waist-slab and tread-riser systems under different support conditions

COURSE CONTENTS:

UNIT-I Basic Principles of Structural Design

Assumptions, Mechanism of load transfer, Various properties of concrete and reinforcing steel, Introduction to working stress method and limit state methods of design, partial safety factor for load and material. Calculation of various loads for structural design of singly reinforced beam, Partial load factors

UNIT -II, Design of Beams

Singly reinforced & doubly reinforced rectangular & Flanged Beams, Lintel, Cantilever,

simply supported and continuous beams, Beams with compression reinforcement. Design of beam for shear and **bond**.

UNIT-III Design of Slabs

Slabs spanning in one direction Cantilever, simply supported and Continuous slabs, spanning in two directions, Circular slabs

UNIT-IV Columns & footing

Effective length of columns, Short and long columns- Square, Rectangular and Circular columns, Isolated and combined footings, Strap footing, Columns subjected to axial loads and bending moments (sections with no tension), Raft foundation.

UNIT-V Staircases

Staircases with waist slab having equal and unequal flights with different support Conditions, Slab less tread-riser staircase

Reference Books:-

1. Shah, V.L., and Karve, S.R., Limit State Theory and Design of Reinforced Concrete Structures, Structures Publications, Pune,2014.
2. Krishna Raju, and N .Pranesh, R.N., Reinforced Concrete Design Principle sand Practice, New Age International, Mumbai.
3. Pillai, S.U., and Menon, Devdas, Reinforced concrete Design, McGraw Hill Publications, New Delhi.
4. Varghese, P.C., Limit State Design of Reinforced Concrete, Prentice Hall India Learning Pri- vat Limited, Delhi.

LIST OF PRACTICAL TO BE PERFORMED:

1. List of Various I.S Code & Notations.
2. Stress & Strain Diagram For Concrete & Steel.
3. Design & analysis of Singly reinforced section.
4. Design & analysis of Doubly reinforced section.
5. Design & analysis of One Way Slabs.
6. Design & analysis of T-Beams.
7. Design & analysis of Two Way Slabs.
8. Design Of Rectangular, square Column.
9. Design of Stair (tread & riser)

10. Design Of Dog Legged Stair

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DCE 503 Irrigation & Hydraulic structure

Subject Code	DCE 503			
Subject Name	Irrigation & Hydraulic structure			
Max. Marks	100			
	L	T	P	TC
	3	1	-	4

COURSE OUTCOMES(COs):

After Completing the course student should be able to:

CO-1	Explain irrigation projects, crop water requirement, duty, and delta with simple calculations.
CO-2	Classify canals and design the most economical canal section with problem-solving.
CO-3	Identify different irrigation structures and illustrate earthen and gravity dams with site selection criteria.
CO-4	Analyze forces, failure modes of gravity dams, and describe spillways and diversion headworks.
CO-5	Differentiate between weirs and barrages and solve discharge problems in weirs.

On successful completion of this course, the student will be able to:

COURSE CONTENTS:

UNIT-I

Classification of irrigation projects - Major, Medium and Minor schemes. Irrigation and its classification. Crop Water requirement: Cropping seasons, Cropping Calendar, Crop period, base period, Duty, Delta, Command area, intensity of irrigation, factors affecting duty. Simple problems on duty.

UNIT-II

Canals: Classification according to alignment and position in the canal network. Canal lining - Purpose, material used and its properties, advantages. Design of most economical canal section. Problems on most economical canal section

UNIT-III

Irrigation structures - Classification of head works - storage and diversion head works - their suitability under different conditions. Storage Head works: Dams and its classification: Earthen dams and Gravity dams (concrete). Earthen Dam: Site selection for earthen dams, typical cross section of earthen dam. Causes of failures of earthen dams (structural failures).

UNIT-IV

Gravity dams: Elementary profile of a gravity dam, list various forces acting on gravity dam, modes of failure of gravity dams. Spillways - Definition, function and location. Diversion head works - Layout, components and their function.

UNIT-V

Weirs - components, parts, types. Weirs - Discharge equation & Simple problems. Barrages - components and their functions. Difference between weir and Barrage.

Reference Books:-

1. Dr. R.K.Bansal : Fluid Mechanics & Hydraulic Machine ; Laxmi Publishers
2. R.S.Khurmi : Hydraulics, Fluid Mechanics & Hydraulic Machines; S. Chand & Co.
3. Modi &Sethi : Hydraulics & Hydraulic Machines ; Standard Publishers
4. R.K.Rajput : Hydraulics ; S.Chand& Co.
5. Jagdish lal : Hydraulics ; Dhanpat Rai & Sons
6. C. Punmia : Irrigation Engineering ; Laxmi Publishing Co:
7. Modi &Sethi : Irrigation Engineering ; Standard Publishing House Department of Technical Education, Government of Karnataka 84
8. S.K.Garg : Irrigation Engineering ; Khanna Publishers.
9. B S Birdie : Irrigation Engineering & Water Power Engg ; Standard Publishing House
10. N.N. Basak : Irrigation Engineering ; McGraw Hill Publishing

Diploma Civil Engineering
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DCE 504 Soil Mechanics

Subject Code	DCE 504			
Subject Name	Soil Mechanics			
Max. Marks	100			
	L	T	P	TC
	3	1	2	6

COURSE OUTCOMES(COs):

After Completing the course student should be able to:

CO-1	Explain soil origin, structure, three-phase system, and determine index properties such as water content, density, specific gravity, grain size distribution, and relative density.
CO-2	Determine Atterberg limits, compute consistency indices, classify soils using different systems, and identify soils in the field.
CO-3	Explain soil water and permeability concepts, apply Darcy's law, conduct permeability tests, and evaluate permeability of layered soils.
CO-4	Analyze seepage, effective stress, flow nets, and seepage through anisotropic and non-homogeneous soils including earth dams..
CO-5	Apply stress distribution theories, interpret pressure bulbs and Newmark's chart, and analyze compaction and contact pressure in soils.

COURSE CONTENTS:

UNIT-I

Introduction, index properties and classification of soils: Definition and scope of soil mechanics, Origin of soil, formation of soil, clay minerals, Soil structure, 3-phase soil system, Basic terminology, and their relations, index properties of soil - Water content, Field density, Specific gravity, Grain size distribution by sieve and hydrometer analysis, Relative density.

UNIT-II

Atterberg limits and their determination, Various indices -Flow-Index, Plasticity Index, Toughness Index, Liquidity Index, Activity Ratio, Different Systems of Soil Classification - Particle Size, Textural, Unified, HRB and IS classification, Field identification of soils.

UNIT-III

Introduction, index properties and classification of soils: Types of soil water, Capillarity in soils, Flow of water through soils, Darcy's Law, permeability, Factors affecting permeability, Laboratory & field tests for determination of coefficient of permeability, Permeability of layered soils.

UNIT-IV

Seepage pressure, total, Neutral and effective stress, Upward and downward seepage through soils, Flow nets: characteristics, Methods of construction of flow net, Application of flow net, Quick condition, Laplace Equation for two –dimensional flow, Seepage through anisotropic soil and non-homogenous soil, Seepage through earth dam.

UNIT-V

Stress distribution in soils and compaction: Boussinesq's and Westergard's theories for point load, uniformly loaded circular and rectangular areas, pressure bulb, Variation of vertical stress under point load along vertical and horizontal plane, Newmark's influence chart for irregular areas, Contact pressure distribution in sands and clays.

Reference Books:-

1. Punamia B.C., Soil Mechanics & Foundations., Firewall Media, 2017 (16th edition)
2. Alam Singh, Modern Geotechnical Engineering., CBS Publishers & Distributors, 2012 (3rd edition)
3. Gopal Ranjan & ASR Rao, Basic & Applied Soil Mechanics. New Age International, 2016 (3rd edition)
4. S.K Grag, Geotechnical Engineering., Khanna Publishers, 2016 (10th edition)

LIST OF PRACTICAL TO BE PERFORMED:

1. Determination of water content by Oven drying method.
2. Determination of water content by Pycnometer

3. Determination of soil field density by core cutter method
4. Determination of soil field density by sand replacement method
5. Determination of Specific Gravity by Pycnometer.
6. Determination of Consistency Limits (i) Liquid Limit (ii) Plastic Limit (iii) Shrinkage Limit
7. Determination of liquid limit of soil by cone penetrometer.
8. Grain size analysis by sieve shaking method
9. Grain size analysis of fine-grained soil by sedimentation using (i) pipette (ii) hydrometer.
10. Determination of coefficient of permeability of soil by- (a) constant head method (b) variable head method.

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DCE 505 Quantity Surveying and Costing

Subject Code	DCE 505			
Subject Name	Quantity Surveying and Costing			
Max. Marks	150			
	L	T	P	TC
	3	1	2	6

COURSE OUTCOMES(COs):

After Completing the course student should be able to:

CO-1	Explain the purpose, importance, and principles of estimating and different types of estimates.
CO-2	Perform rate analysis of various construction items considering labour, material, and equipment requirements.
CO-3	Prepare detailed estimates for buildings, RCC works, roads, culverts, and building services.
CO-4	Analyze cost components, overhead charges, and prepare Detailed Project Reports (DPRs).
CO-5	Apply valuation principles for civil engineering properties including depreciation, sinking fund, and rent fixation.

COURSE CONTENTS:

UNIT-I – Introduction to Estimating & Costing

Purpose and importance of estimates in civil engineering. General principles of estimating. Methods of taking out quantities of items of work. Mode of measurement, measurement sheet, and abstract sheet. Bill of quantities (BOQ) and its preparation. Types of estimates: plinth area rate, cubical content rate. Preliminary, original, revised, and supplementary estimates for different projects.

UNIT-II – Rate Analysis

Concept of task/work output for an average artisan. Factors influencing rate of an item. Labour and material requirements for common construction trades. Step-by-step preparation of rates for important construction items. Use and application of Current Schedule of Rates (CSR).

UNIT-III – Detailed Estimates

Detailed estimates of different types of buildings. RCC works (slabs, beams, columns, foundations). Earthwork calculations for roads. Estimating for culverts. Estimation of building services: water supply, sanitary and drainage works, electrification.

UNIT-IV – Cost of Works & DPR

Factors affecting cost of works. Overhead charges, contingencies, work-charged establishment. Standard percentages for various services in buildings. Preparation and components of a Detailed Project Report (DPR).

UNIT-V – Valuation of Civil Engineering Works (08 hrs)

Purposes and necessity of valuation. Concepts of depreciation, sinking fund, and scrap value. Year's purchase, gross and net income, dual rate interest. Different methods of valuation. Rent fixation for residential and commercial buildings.

Reference Books: -

1. B.N. Dutta, Estimating and Costing in Civil Engineering (Theory and Practice), UBS Publishers, New Delhi, 2016.
2. G.S. Birdie, *Textbook of Estimating and Costing (Civil Engineering)*, Dhanpat Rai Publications, New Delhi, 2010.
3. A.K. Chakraborti, Estimating, Costing, Specification and Valuation in Civil Engineering, UBS Publishers, New Delhi, 2012.
4. B.N. Rangwala & S.C. Rangwala, *Estimating, Costing and Valuation (Civil Engineering)*, Charotar Publishing House, Anand, 2014.

LIST OF PRACTICAL TO BE PERFORMED:

1. Preparation of a list of items to be executed with units for detailed estimate of a given structure from the drawing (Load Bearing Wall).
2. Preparation of a detailed estimate for a small residential building (1BHK with staircase) using measurement sheet and abstract sheet.
3. Detailed estimate for services: plumbing and water supply system of a residential

building.

4. Detailed estimate for road earthwork for a given alignment (1 km length).
5. Rate analysis of at least 5 important construction items (e.g., brick masonry, plastering, PCC, RCC, flooring).
6. Calculation of reinforcement quantities and preparation of Bar Bending Schedule (BBS) for a room (covering footing, column, beam, slab, lintel with chajja).
7. Preparation of bill of quantities (BOQ) for given items from actual site measurements (any 3–4 items such as brickwork, plaster, flooring, etc.).
8. Preparation of approximate estimate for a septic tank based on given drawing and design data.
9. Use of relevant software (e.g., MS Excel/AutoCAD/Estimation software) to prepare a detailed estimate of a small residential building (G+1).

Diploma Civil Engineering
Vth Semester Syllabus**DCE 506 Minor Project**

Subject Code	DCE 506			
Subject Name	Minor project			
Max. Marks	50			
	L	T	P	TC
	-	-	2	2

Students shall identify a small civil engineering problem related to design, construction, surveying, materials, or environmental issues and prepare a minor project that includes planning, data collection, analysis, and a concise technical report. Example Minor Project

Topics

1. Estimation and costing of a small residential room
2. Traffic volume study at a local intersection
3. Soil testing and basic bearing capacity assessment
4. Water quality analysis of nearby sources
5. AutoCAD drafting of a simple building plan
6. Concrete mix design using available materials
7. Surveying of a land parcel using leveling and total station
8. Rainwater harvesting layout for a house

A clear and short minor project report should include Report Details

1. Title Page
2. Introduction & Objectives
3. Methodology / Data Collection
4. Analysis, Drawings, Calculations
5. Results & Discussion
6. Conclusion & Suggestions
7. References