



**3-Year Diploma Engineering Curriculum and
Syllabus for Civil Engineering (CE)**

FOURTH SEMESTER

A. THEORY

Sl No.	Code Number	Subject	Contact Hours				Credit Point
			L	T	P	Total	
1	TIU-DEN-T200	Career Advancement & Skill Development	3	0	0	3	3
2	TIU-DCE-T212	Surveying - II	3	0	0	3	3
3	TIU-DCE-T214	Geotechnical Engineering - I	3	0	0	3	3
4	TIU-DCE-T216	Analysis of Structures	3	0	0	3	3
5	TIU-DCE-T218	Estimation and Costing	3	1	0	4	4
6	TIU-DCE-T220	Irrigation Engineering	3	0	0	3	3
Total Theory			19				19

B. PRACTICAL

7	TIU-DCE-L212	Concrete Lab	0	0	3	3	2
Total Practical			3				2

C. SESSIONAL

10	TIU-DCE-S202	Civil Engineering Drawing - II	0	0	3	3	2
11	TIU-DES-S298	Entrepreneurship Skill Development	0	0	0	0	2
Total Sessional			3				4

Total of Semester

25 25



SURVEYING-II

TIU-DCE-T212

L-T-P: 3-0-0

Credits: 3

UNIT1: THEODOLITE SURVEYING:

Components of Transit Theodolite and Their functions. Technical terms used. Temporary adjustments of Transit Theodolite swinging the telescope, Transiting, Changing the face.

Measurement of Horizontal angle, method of Repetition, errors eliminated by method of repetition.

Measurement of Deflection angle. Measurement of Vertical angle.

Measurement of magnetic bearing of a line by Theodolite. Prolonging a Straight line.

Sources of errors in Theodolite Surveying.

Permanent adjustment of transit Theodolite (only relationship of different axes of Theodolite).

Traversing with Theodolite – Method of included angles, locating details, checks in closed traverse, Calculation of bearings from angles.

Traverse Computation - Latitude, Departure, Consecutive Co-ordinates, error of Closure, Distribution of an angular error, balancing the traverse by Bowditch rule and Transit Rule, Gale's traverse table (simple problems on above topic.)

UNIT2: TACHOMETRIC SURVEYING:

Principle of Tachometry. Instruments in tacheometry.

Essential requirements of Tacheometer.

Different types of tachometric measurement – a] stadia system (fixed hair method and movable hair method)

b] tangential system c] subtense bar system.

Determination of tachometric constants- additive constant and multiplying constant, simple numerical problems on above topics.

Distance and elevation formula : Fixed hair method.

Use of Theodolite as a Tacheometer i. Inclined sight and staff vertical for both angle of elevation and angle of depression ii. Inclined sight with staff normal to the line of sight (for both angle of elevation and angle of depression) (No derivation). [Numerical problem based on above conditions]

UNIT3: CURVE:

Types of curves used in road and railway alignments, Notations of simple circular curve, Designation of curve by radius and degree of curves.

Method of Setting out curve by offset from Long chord method and Rankine's method of deflection angles.

Simple Numerical problems on above topics.

UNIT4: AREA & VOLUME COMPUTATION:

Introduction, Computation of area from field notes, Different methods of Volume calculation, worked out problems.



TECHNO INDIA UNIVERSITY
WESTBENGAL

EM 4, Sector V, Salt Lake, Kolkata-700091, West Bengal, India
Phone: +91 9836544416/17/18/19, Fax: +91 33 2357 1097

UNIT5: MODERN METHODS OF SURVEYING:

Introduction of EDM, GPS and GIS. Remote sensing and their application. Use of total station



GEOTECHNICAL ENGINEERING-I

TIU-DCE-T214

L-T-P: 3-0-0

Credits: 3

UNIT1: INTRODUCTION

Definition of soil, soil mechanics, origin and formation of soils and soil categories. Principles of mechanics applied to soils, importance of soil mechanics.

UNIT2: SOLID-WATER-AIR RELATIONSHIPS AND INDEX PROPERTIES OF SOIL

Phase diagram for dry, moist and saturated soil. Definitions- void ratio, porosity, and water content, degree of saturation, unit weight, specific gravity, density – bulk density, dry density, submerged density, air content, and percentage of air voids. Numerical problems on the above properties. Index properties of soil, grain size distribution. Consistency of clays: Atterberg Limits

UNIT3: CLASSIFICATION OF SOILS

Engineering classification of soil-particle size, The Unified Soil Classification system, AASHTO soil classification system, Indian standard soil classification system, textural classification chart.

UNIT4: PERMEABILITY OF SOILS

Definition of permeability, Darcy's law, factors affecting permeability. Determination of Coefficient of permeability by constant head and variable head permeameters.

UNIT5: SEEPAGE THROUGH SOILS

Introduction, Concept of seepage flow, flow nets, flow lines, equipotential lines, flow channel. Critical hydraulic gradient, quick sand condition and seepage forces.

UNIT6: SOIL COMPACTION

Definition, determination of optimum moisture content and dry density by proctor's compaction test, importance of compaction and factors influencing compaction. Field compaction methods, field density determination by core cutter method.

UNIT7: CONSOLIDATION

Definition of consolidation, components of total settlement, compressibility, time rate of consolidation, consolidation test, computation of settlement.

UNIT8: SHEAR STRENGTH OF SOILS

Introduction, stress at a point-Mohr circle of stress, Definition of shear strength and shear parameters. Mohr's Coulomb failure theory, relation between major and minor principle stresses, Field measurement of shear strength.



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UNIT9: EARTH PRESSURES

Introduction, effect of wall movement on earth pressure, earth pressure at rest, Rankine's theory of earth pressure.



ANALYSIS OF STRUCTURES

TIU-DCE-T216

L-T-P: 3-0-0

Credits: 3

UNIT 1: SLOPE AND DEFLECTION ANALYSIS OF BEAMS

Application of 'Moment area theorem' for determining the slope and deflection at a particular point of a simply supported and cantilever beam for point loading, UDL and moment. Double integration method and Conjugate beam theory.

UNIT 2: DEFLECTION ANALYSIS OF TRUSS BY GRAPHICAL METHOD

Williot-Mohr diagram. Analysis of Complex trusses Heneberg's bar exchange method.

UNIT 3: CONTINUOUS BEAMS

Definition, effect of continuity practical example, nature of moments induced due to continuity, concept of deflected shape. Clapeyron's theorem of three moment (no derivation)- its application maximum up to two spans (one end may be fixed and with one overhanging span) and one unknown support moment only, Support at same level, spans having same moment of inertia subjected to concentrated loads and uniformly distributed loads over entire span.

Introduction to moment distribution methods, sign convention, Carry over factor, stiffness factor, distribution factor - its application maximum up to two spans (one end may be fixed and with one overhanging span) and one unknown support moment only, Support at same level, spans having same moment of inertia subjected to concentrated loads and uniformly distributed loads over entire span. Drawing SF and BM diagrams for continuous beams. Application of moment distribution method to single storey single bay symmetrical portal frames, SF and BM diagrams

UNIT 4: COLUMNS

Types of columns, application of Rankin's and Euler theory for buckling load calculation, designing solid circular or hollow circular sections



ESTIMATION AND COSTING

TIU-DCE-T218

L-T-P: 3-1-0

Credits: 4

UNIT -1 OVERVIEW OF ESTIMATING & COSTING

Meaning of the terms estimating, costing. Purpose of estimating and costing, factors affecting estimate. Types of estimate - Approximate and Detailed. Approximate estimate Types- Plinth area rate method, Cubic Content method, Service Unit method, Typical bay method, Approximate Quantity method, Problems on Plinth area rate method & application of Service unit method for selection of service unit for different types of civil Engineering Structures, Approximation for W.S. Sanitary & Electrification, Knowledge of empirical method of approximate material estimation as per CBRI formulae and its application.

Types of detailed estimate: Detailed estimate for new work, Revised estimate, Supplementary estimate, Revised & Supplementary estimate, Maintenance & Repair estimate, complete estimate; phase of the detailed estimate – quantity survey and abstract estimate, Uses of detailed estimate

Explanation of relevant technical terms: Contingencies, work-charge establishment, overhead, tools and plants, schedule of rates and quantities, specification, administrative approval, technical sanction, plinth area, carpet area, floor area, horizontal and vertical circulation area, floor area ratio. Degree of accuracy, mode of measurement as per BIS 1200.

UNIT 2: BUILDING ESTIMATE

Note: Single storied building shall comprise of two rooms, bath, WC, kitchen, front verandah with a provision of staircase and mummy for utilization of roof space

Centre line method and long & short wall method

Items of work –earth work in excavation for foundation, brick flat soling (under foundation and floor subgrade, foundation concrete, brick in substructure, earth work in filling, DPC, plinth filling by silver sand, brickwork in superstructure, formwork, RCC excluding reinforcement, reinforcement (by percentage of component of structure, lime terracing or other similar roof treatment, finishing items – plastering, painting (on plastered surface wall, RCC surface, doors windows, grill etc), floor – (IPS, terrazzo, tiles, stone), rain water pipe.

Preparation of bar bending schedule – lintel and chajja, column, slab (one way and two way), beam and their estimate

Estimate of door and window – paneled door, one third glazed and two-third paneled timber



window, fully glazed steel window provided with a grill (inclusive of all fittings and fixtures)

Estimate of a tube-well

Estimate of a septic tank with soak pit

Estimate for surface drain with plinth protection around the building and underground reservoir

Estimation of symmetrical/unsymmetrical boundary wall with a provision of gate.

UNIT 3 ESTIMATE OF OTHER STRUCTURE

Estimate of a single span slab culvert/pipe culvert

Estimate of a man-hole.

Estimate of simple fink type roof truss

UNIT – 4 RATE ANALYSES

Meaning of term Rate analysis and its purposes –Factors affecting rate analysis, lead, lift, task work, materials and labor component, Market Rate and labor rate.

Transportation of Materials, load factor for different materials. Standard lead, extra lead,

Transportation Charges, Labor - Categories of labors, labor rates, overheads, contractor's profit,

water charges, taking out quantities of materials for different items of works (earthwork,

brickwork, flooring, roofing, plastering and pointing, whitewash, color wash, distemper, synthetic

enamel, plastic paints, emulsion paint, cement concrete, reinforcement, formwork, grill for

window

Preparing rate analysis of different items of work - (earthwork, brickwork, flooring, roofing,

plastering and pointing, whitewash, color wash, distemper, synthetic enamel, plastic paints,

emulsion paint, cement concrete, reinforcement, formwork, grill for window



IRRIGATION ENGINEERING

TIU-DCE-T220

L-T-P: 3-0-0

Credits: 3

UNIT1 : INTRODUCTION

Definition of irrigation, necessity of irrigation, benefits of irrigation, ill effects of irrigation.

Types of irrigation system – general principles of flow, lift, perennial inundation, tank and well irrigation.

Methods of irrigation – surface irrigation, sprinkler irrigation and sub-surface irrigation.

UNIT2 : HYDROLOGY

Hydrological cycle, Precipitation. Measurement of rainfall, Mean precipitation over an area,

Abstractions from Precipitation: Evaporation, Transpiration, Evapotranspiration, Infiltration.

Run off and run off co-efficient, factors affecting run off, rational method of measurement of run off indirectly.

Hydrographs: Introduction, Effective Rainfall, Unit Hydrograph

UNIT3 : WATER REQUIREMENT OF CROPS

Definition of duty, delta and base period; crop period, crop seasons, crops in India; factors affecting duty; methods of improving duty; relation between duty, delta and base period; rotation of crops, duty for kharif and rabi crops.

Commanded area, intensity of irrigation, cumecs, capacity factor, time factor, outlet factor, crop ratio, overlap allowance; numerical problems.

UNIT4 : CANAL IRRIGATION

Different types of canals; classification of irrigation canal based on – (i) source of supply, (ii) function, (iii) discharge, (iv) alignment.

Different parts of an irrigation canal and their functions, canal sections in cutting, in filling and partly in cutting and partly in filling.

Losses of water in canals – percolation, evaporation and absorption in losses; canal lining – definition, types and advantages of lining, considerations for canal alignment; selection of site for canal off take point.

UNIT5 : SEDIMENT TRANSPORT

Importance of sediment transport, sediment load.

Design of stable channels in India, Kennedy's theory and lacey's theory



UNIT6 : DIVERSIONS HEAD WORKS

Definition, object, general layout and functions of each part.

Weir and barrage – Definition, different between two, general principles of design, various types of weirs, profile of weir wall, upstream apron, downstream talus. Principles governing design and construction of barrages.

UNIT7 : LINING OF IRRIGATION CANALS

Advantages of lining, Annual benefits and Annual costs for lining, Types of lining.

UNIT8 : FLOOD CONTROL

Definition of flood, causes of flood, effects of flood. Methods of flood control – flood Control reservoirs, flood walls, channel improvement, flood ways.

UNIT9 : WATER LOGGING

Introduction – ill effects of water logging, causes of water logging, factors responsible for water logging.

Anti water-logging measures – preventive measure – names of the different measures with short description.

Land reclamation, methods of land reclamation – name the methods with brief description.

Land drainage – methods of drainage with brief description mentioning location, construction and cost.

UNIT10 : MAJOR IRRIGATION PROJECTS IN INDIA

Name of the different projects with salient points regarding their purpose, object, capacity, components, etc.



CONCRETE TECHNOLOGY LABORATORY

TIU-DCE-L212

L-T-P: 0-0-3

Credits: 2

Group I – Tests on Ordinary Portland cement:

Determination of fineness of cement by sieving.

Determination of standard consistency of OPC/PPC

Determination of initial & final setting times of OPC/PPC.

Determination of compressive strength of OPC/PPC

Determination of soundness of OPC/PPC

Group II – Physical tests on fine aggregate and coarse aggregate:

Fine aggregate:

Determination of silt content in sand by volume.

Determination of maximum % of bulking of sand of a given sample.

Determination of grading zone of a given sample.

Determination of moisture content of a given sample of sand.

Determination of specific gravity of sand.

Coarse aggregate:

Determination of aggregate impact value.

Determination of bulk density & specific gravity of a given sample of coarse aggregate.

Determination of flakiness index and elongation index of a given sample of coarse aggregate

Determination of surface moisture and water absorption of a given sample of coarse aggregate

Determination of grading zone of a given sample of coarse aggregate

Determination of workability of concrete – a. Slump test b. Compacting factor test

Compressive strength of concrete –cube mould

Group III- Tests on Concrete:

Determination of workability of concrete by slump test.

Determination of workability of concrete by Compacting Factor Test.

Compressive strength of concrete cube mould.

Concrete Mix Design.



CIVIL ENGINEERING DRAWING- II

TIU-DCE-S202

L-T-P: 0-0-3

Credits: 2

UNIT 1 INTRODUCTION

Recapitulation of previous semester

UNIT -2 PLANNING OF RESIDENTIAL BUILDING (PLATE 1)

(Note: Two storeyed building shall comprise of two rooms, bathroom, WC, kitchen, front verandah with a provision of staircase and mummy for utilisation of roof space.)

Principles of planning of Residential and Public building.

Space requirements and norms for various units of Residential and Public building.

Rules and byelaws of local governing authorities for construction.

Drawing of line plans for Residential and Public building.

Development of line plan – ground floor plan and roof plan with provision for drainage layout

Elevation (front & back)

Two Sectional elevation (section must pass through stair-case, bath WC, kitchen and front verandah)

Site plan AND Foundation details (trench plan, section of main wall and a partition wall/ isolated footing with tie beam if provided)

UNIT 3: ELECTRICAL AND PLUMBING LAYOUT OF BUILDING (PLATE 2)

Development of electrical layout and plumbing layout of the same building as in Plate 1. Development of plan as well as necessary sectional Elevation to show complete detailing

UNIT4: STEEL ROOF TRUSS (PLATE 3)

Introduction to truss – wooden (king post and queen post), steel (with angles and tubular truss) along with demonstration of model

Details of a fink truss with welded/riveted joints and details of column connection