

FOURTH SEMESTER						
COURSE CONTENTS						
CE4301	Surveying	L	T	P	Max. Marks	Min. Marks
Duration	6 Hours				70	22

UNIT-I

CE-4001 SURVEYING

Course objective:

To impart the students the principle & working of surveying instruments, calculation of area, volume & determination of difference in levels & height and distance and drawing of plan so that proper execution can be made at the time of construction or wherever required.

Course outcomes

The students will be able to:

- CO1 Apply the principles of surveying and its implications to various civil engineering applications.
- CO2 Utilize conventional surveying equipment such as plane table, auto level for evaluating length, area & volume.
- CO3 Draw plan of various areas & Plotting of profile leveling and contours for various civil engineering applications.
- CO4 Utilize theodolite & tacheometer & determine height and distance of various structures.
- CO5 Utilize total station & determine height and distance of various structures.

Plane table Surveying: - Introduction, Principle, and accessories used in plane tabling, advantages and disadvantages. Setting of Plane Table, Orienting the Table. Methods of Plane Tabling, Radiation, Intersection, Measurement of Area and Volume, Minor Instruments.

UNIT - II

Topographic Surveying: - Introduction, Procedure of Topography Survey, Route Survey (L-Section & Cross-Section), Contouring (Characteristics & Methods).

UNIT - III

Theodolite: - Introduction & important definitions, Construction detail of Transit Theodolite, temporary and permanent adjustments, measurement of horizontal and vertical angles, Traversing, Closing error, traverse computations, and omitted measurements etc.

UNIT - IV

Tachometry: - Principle of tacheometric systems, construction details, stadia system, uses of anallatic lens, tangential system, subtense system, instrument constant (laboratory & field), field work, use of tacheometry for traversing and contouring.

UNIT - V

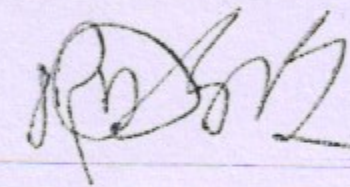
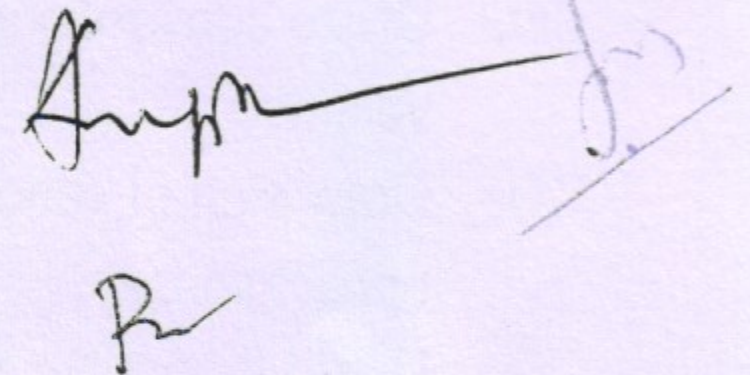
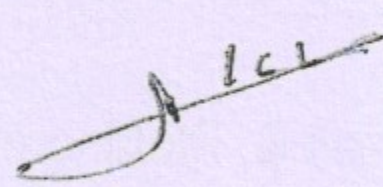
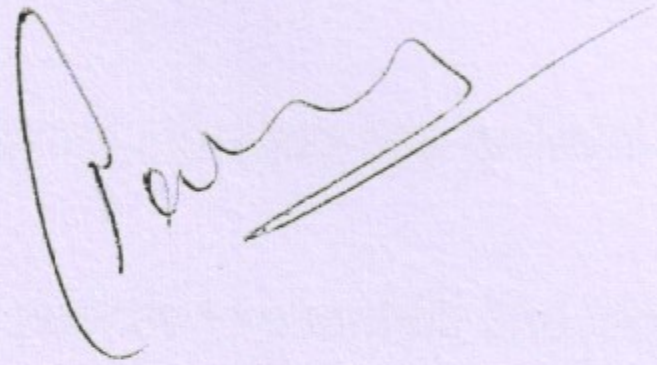
Trigonometric Leveling: - Trigonometrical leveling, determination of height and distance when the base of the object is accessible and inaccessible, curvature and refraction correction, reciprocal leveling. Introduction to Total Stations.

Laboratory Work:-

1. Plane Table Survey by Radiation Method.
2. Plane Table Survey by Intersection Method.
3. Contouring of small areas.
4. Profile Leveling (L-Section & Cross-Section).
5. Study of Theodolite and measurements of horizontal and vertical angles.
6. Measurement of horizontal angles by Reiteration method.
7. Determining the height and distance of lighting conductor when the base of the object is inaccessible.
8. Determination of Tachometric constants
9. Determination of height and distance of a point by tachometric method.

Reference Books: -

1. T.P. Kanetkar – Surveying and Leveling Vol. I & II, Pune Vidhyarthi Griha Prakashan, Pune
2. B.C. Punmia – Surveying Vol. I & II, Laxmi Publications New Delhi
3. S.K. Duggal - Surveying and Leveling, Tata McGraw Hill .
4. H.K. Basak - Surveying and Leveling, Tata McGraw Hill .
5. K. R. Arora – Surveying Vol. I & II, Standard Book House



Theory of structure

FOURTH SEMESTER			CIVIL ENGINEERING			
COURSE CONTENTS						
CE4802	<i>Structural Analysis</i> Theory of Structure	L	T	P	Max. Marks	Min. Marks
Duration	3 Hours	3	1	1	70	22

Course Objective

To familiarize students to calculate unknown forces and displacements of indeterminate structures under various types of loading, adopting different methods of analysis.

Determinate /

UNIT - I

Virtual work and Energy Principles : Principles of Virtual work applied to deformable bodies, strain energy and complementary energy, Energy theorems, Maxwell's Reciprocal theorem, Analysis of Pin-Jointed, determinate indeterminate for static loads using Castigliano's theorem.

UNIT - II

Indeterminate Structures-I. Analysis of beam and frames by consistence deformation method, Moment distribution methods in analysis of frames with sway analysis of beams and frames. Analysis of box frames, analysis of portals with inclined members. Analysis of beams and frames by slope Deflection method.

UNIT - III

Indeterminate Structures-II: Analysis of beams and frames by Column Analogy method, Kani's method and matrix method of analysis: stiffness and flexibility method.

UNIT - IV

Arches and Suspension Cables: Suspension cable, stiffening girders, Two Hinged and Fixed Arches - Rib shortening and temperature effects.

Theory of Plasticity and plastic analysis of simply supported, Cantilever, fixed and continuous beam and frames.

UNIT - V

Rolling loads and Influence Lines: Influence Lines for Determinate structures: Maximum SF and BM for various types of Rolling loads for beams, trusses and bridges. Influence line diagram of Indeterminate Structures- Beams, Muller Breslau principle.

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Reference Books :

- Ghali A & Neville M., Structural Analysis - A Unified classical and matrix Approach, Chapman and Hall, New York.
- Wang C.K. Intermediate structural analysis, McGraw Hill, New York.
- Kinney Streling J. Indeterminate structural Analysis, Addison Wesley.
- Reddy C.S., Basic Structural Analysis, Tata McGraw Hill Publishing Company, New Delhi.
- Norris C.H., Wilbur J.B. and Utkys. Elementry Structural Analysis, McGraw Hill International, Tokyo.
- Theory of Structure – I by B.C. Punmia.
- Theory of Structure – I by Ramamurtam.

Course Outcomes

After attending this course, the students will be able to

- Apply the principle of virtual work to determine deflection of a structural member. To apply unit load method, Maxwell theorem and Castligiano's theorem to find the deflection. To analyze the pin-jointed trusses for static loading.
- Analyze the beams and frames slope deflection, moment distribution and consistent deformation method for analysis of indeterminate structures and to determine the effect of support settlements for indeterminate structures
- Analyze the beams and frames by using matrix method, column analogy and kani's method of analysis.
- To analyze two hinge and fixed arch. Analyze beams and frames by plastic theory of analysis.
- To apply the concepts of ILD for various types of moving loads on determinate structures and indeterminate structures.

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FOURTH SEMESTER				CIVIL ENGINEERING		
COURSE CONTENTS						
CE4303	Construction Technology	L	T	P	Max. Marks	Min. Marks
Duration	5 Hours				70	22

CE-4003 Construction Technology

Course Objectives:

To introduce the commonly adopted materials in construction with strong emphasis on concrete technology and its mix design

Course Outcomes

The Students will be able to

- CO1 Apply the engineering knowledge in the selection of suitable materials for various construction projects
- CO2 Test the suitability of materials such as bricks, aggregate and cement commonly used in construction works.
- CO3 Perform destructive and non-destructive tests on fresh and hardened concrete.
- CO4 Apply their engineering knowledge in classification and selection of ingredients and type of concrete.
- CO5 Illustrate the methods for manufacturing special concretes using various materials and admixtures.
- CO6 Interpret the properties and understand the factors affecting the performance of concrete and carry out its mix design.

UNIT-I

Material: Brick, Cement, Mortar, Advance construction material of fly ash in mortar and concrete and other materials.

UNIT-II

Concrete Technology: Introduction Classification, properties, grades, advantage and disadvantages of concrete, ingredients of concrete, types of cement, Sand, aggregates, water and admixtures.

UNIT-III

Testing of Concrete: Inspection, testing and quality control of constituent materials of concrete as per Indian Standard Specification. **Admixtures:** various types, their role in concrete. **Type of concrete:** Light weight concrete, Ferro cement, fiber reinforced concrete, polymer concrete composites. Properties & uses.

UNIT-IV

Properties of Fresh and Hardened Concrete: Introduction, Workability, Testing of concrete, factors affecting concrete, Rheology of concrete, Compressive and Tensile strength, Stress and strain characteristics, shrinkage and temperature effects. Creep of concrete permeability, durability, thermal properties and micro cracking of concrete.

UNIT-V

Design of Concrete Mix: Various classical methods of concrete mix design, I.S. code method, basic considerations and factors influencing the choice of mix design, acceptance criteria for concrete, concrete mixes with Pozzolan materials.

Reference Books-

1. Varshney R.S. Concrete Technology, Oxford & IBH Publishing Co.
2. Gambhir ML; Concrete Technology- TMH.
3. Shetty, M.S. – Concrete Technology.
4. Sinha SN, Reinforced Concrete Technology, TMH.
5. New Building Materials Published by BMTPC New Delhi.

6. Hand Books on Materials & Technology, Published by BMTPC & HUDCO.
7. Mohan Rai & M.P. Jaisingh, Advances in Building Materials and Constructions.
8. Jackson N, Civil Engineering Materials.
9. Properties of Concrete – AM Neville- Person Education.
10. Advance in Building Materials & construction, Mohan Rai & M.P. Jai Singh.
11. Engineering Materials, S.C. Rangwala.
12. Building Construction, Sushil Kumar.
13. Building Construction, B.C. Punmia.
14. Building Construction, Metchell.

List of Experiments:

1. Tests of Bricks.
2. Tests of Aggregates.
3. Tests of Cement.
4. Determination of compressive strength of concrete with different cement grades.
5. Determination of workability of concrete by slump test.
6. Determination of workability of concrete by compacting factor apparatus.
7. Design of different concrete mix.
8. Nondestructive testing of concrete by rebound hammer test.
9. Nondestructive testing of concrete by ultrasonic method.
10. Test for the effect of admixtures on the concrete compressive strength.

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Fourth

FIFTH SEMESTER					CIVIL ENGINEERING	
COURSE CONTENTS						
CE4304	Environmental Engineering – I	L	T	P	Max. Marks	Min. Marks
Duration	3 Hours				70	22

CE-5004 Environmental Engineering – I

Course Objectives

- To demonstrate the various sources of water and water demands for estimation of water requirements for a location.
- To explain the different methods of population forecasting, fluctuations in water demand and various components considered in planning for water supply scheme.
- To demonstrate the potable water quality and examine the different physical, chemical and biological characteristics of water.
- To illustrate the various types of pipes, pumps and intakes considered in the planning of water supply scheme.
- To elucidate the various unit operations and processes adopted in the design of water treatment plant.
- To discuss the consideration in planning and design of distribution system.
- To familiarize the students about the rural water supply schemes and plumbing system for water supply in houses.

Course Outcomes

On the completion of this course the students will be able to:

- CO1 Estimate the future water requirements considering the available water resources and future population growth for any locality.
- CO2 To interpret the quality of water and necessary requirements for domestic purposes.
- CO3 To identify the suitable components such as intakes, pipes and pumps in planning for water supply scheme.
- CO4 To organize and design different unit processes and operations in water treatment.
- CO5 To estimate the quantitative requirements of distribution system and analyze the pipes accordingly.
- CO6 To plan plumbing system for houses.

UNIT - I

Quality of water from different sources, demand & quality of water, fire demand, water requirement for various uses, fluctuations in demand, forecast of population.

UNIT - II

Impurities of water and their significance, water-borne diseases, control of water borne diseases, physical, chemical and bacteriological analysis of water, water quality standards for different uses. Intake structures, design of intakes and conveyance of water, pipe materials, pumps-operation and pumping stations.

UNIT - III

Water Treatment methods, Primary & secondary treatment, theory and design of sedimentation, coagulation, filtration, disinfection, aeration & water softening, modern trends in sedimentation & filtration, miscellaneous methods of treatment, detailing & maintenance of treatment limits.

UNIT - IV

Conveyance and distributions systems, Layout and hydraulics of different distribution systems, pipe fittings, valves and appurtenances, analysis of distribution system. Hardy cross method, leak detection & control, maintenance of distribution systems, service reservoir capacity and height of reservoir.

UNIT - V

Rural water supply schemes, financing and management of water supply project, water pollution control act, conservancy & water carriage system, sanitary appliance and their operation, building drainage system of plumbing.

Suggested Books and Reading Materials:-

- (i) Water Supply Engineering by B.C. Punmia - Laxmi Publications (P) Ltd. New Delhi.
- (ii) Water Supply & Sanitary Engg. by G.S. Birdi - Laxmi Publications (P) Ltd. New Delhi.
- (iii) Water & Waste Water Technology by Mark J. Hammer - Prentice - Hall of India, New Delhi.
- (iv) Environmental Engineering - H.S. Peavy & D.R. Rowe - Mc Graw Hill Book Company, New Delhi.
- (v) Water Supply & Sanitary Engg. by S.K. Husain.
- (vi) Water & Wastewater Technology - G.M. Fair & J.C. Geyer.
- (vii) Relevant IS Codes.
- (viii) Manual of CPHEEO by MEF.

List of Experiments:

- (i) Study of the various standards for water.
- (ii) Study of sampling techniques for water.
- (iii) Measurement of turbidity.
- (iv) To determine the coagulant dose required to treat the given turbid water sample.
- (v) To determine the conc. of chlorides in a given water samples.
- (vi) Determination of hardness of the given sample.
- (vii) Determination of residual chlorine by "Chloroscope" or any other method.
- (viii) Determination of Alkalinity in a water samples.
- (ix) Determination of Acidity in a water samples.
- (x) Determination of Dissolved Oxygen (DO) in the water sample.

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Fourth Semester					Civil Engineering	
COURSE CONTENTS						
CE4305	Water Resource Engineering	L	T	P	Max. Marks	Min. Marks
Duration	3 Hours	3			70	22

COURSE OBJECTIVE:

- To understand the various types of irrigation, irrigation methods and crop water requirements.
- To build on the student's background in hydrology and understanding of water resources systems.
- To understand the analysis of reservoir storage and knowledge of various types of dams.

UNIT - I

Irrigation water requirement and soil-water-crop relationship: Irrigation, definition, necessity, advantages and disadvantages, types and methods, Irrigation development.

Soils - types and their occurrence, suitability for irrigation purposes, wilting coefficient and field capacity, optimum water supply, consumptive use and its determination. Irrigation methods- surface and subsurface, sprinkler and drip irrigation.

Duty of water, factors affecting duty and methods to improve duty, suitability of water for irrigation, crops and crop seasons, principal crops and their water requirement, crop ratio and crop rotation, intensity of irrigation.

UNIT - II

Hydrology: Hydrological cycle, precipitation and its measurement, recording and non recording rain gauges, estimating missing rainfall data, rain gauge net works, mean depth of precipitation over a drainage area, mass rainfall curves, intensity-duration curves, depth-area duration curves,

UNIT III

Rainfall indices and hydrographs: Infiltration and infiltration indices, evaporation stream gauging, run off and its estimation, hydrograph analysis, unit hydrograph and its derivation from isolated and complex storms, S-curve hydrograph, synthetic unit hydrograph, Groundwater

UNIT - IV

Reservoirs and storage works: Types of reservoirs, reservoir planning, various investigations, estimation of storage capacity by mass curve analysis, fixing of principal levels in a storage project, economical height of dam, reservoir redimentation, suitable site for a reservoir project.

Dams - classification, selection of suitable type of dam at a particular location.

(P. Aggarwal)

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(Abhishek Sharma)