SANDIP UNIVERSITY

School of Engineering and Technology

Civil Engineering Department

B.Tech. Civil Engineering

Semester	Course I	Course II	Course III	Course IV	Course V	Course VI	Course VII	Course VIII	L	T	P	C	Contact Hours
III	17YCE301	17YCE302	17YCE303	17YCE304	Common	17YCE311	Code		17	0	8	21	**25**
	L T P C: 3 0 2 **4**	L T P C: 3 0 2 **4**	L T P C: 3 0 2 **4**	L T P C: 3 0 2 **4**	L T P C: 3 0 0 **3**	L T P C: 0 0 0 **1**	L T P C: 2 0 0 **1**	L T P C: 0 0 0 **0**					
	PC	PC	PC	PC	BS	MC	HSS						
	Civil Engineering Materials and Concrete Technology(MB)	Surveying	Fluid Mechanics	Mechanics of Materials	SPVC	Internship I	HSS(Foreign Language)						
IV	17YCE401	17YCE402	17YCE403	17YCE404	17YCE405	Common			16	0	10	21	**26**
	L T P C: 3 0 2 **4**	L T P C: 3 0 0 **3**	L T P C: 3 0 2 **4**	L T P C: 3 0 2 **4**	L T P C: 2 0 4 **4**	L T P C: 2 0 0 **2**	L T P C: 0 0 0	L T P C: 0 0 0 **0**					
	PC	PC	PC	PC	PC	ES							
	Advanced Fluid Mechanics	Structural Analysis I	Geotechnical Engineering (MB)	Transportation Engineering I	Architectural Planning, Design and Drawing	Artificial Intelligence and Machine Learning							

SANDIP UNIVERSITY

School of Engineering and Technology

Civil Engineering Department

Year: S.E B.Tech. **Semester: III**

Course : Civil Engineering Materials and Concrete Technology **Course Code: 17 YCE301**

Teaching Scheme (Hrs/Week)				Continuous Internal Assessment (CIA)					End Semester Examination		Total
L	**T**	**P**	**C**	**CIA-1**	**CIA-2**	**CIA-3**	**CIA-4**	**Lab**	**Theory**	**Lab**	
3	**0**	**2**	**4**	10	20	10	10	25	100	25	**150**
Max. Time, End Semester Exam (Theory) - 3 Hrs.									**End Semester Exam (Lab) - 3Hrs.**		

Prerequisite	1. **Basic knowledge of surrounding available material** 2. **Basic Mathematics**

Course Objectives	
1	To study different types of materials used in construction for civil engineering projects
2	To describe all basic activities of construction from foundation to finishing.
3	To understand the properties of ingredients of concrete.
4	To study the behaviour of concrete in its fresh and hardened state.
5	To study the concrete mix design as per Indian Standard guidelines.

Course Content			
Unit No.	Module No.	Content	Hours
1	I	**Masonry:** Stone masonry: principal terms, types of stone masonry. Brick masonry: characteristics of good building bricks, is specification and tests, classification of bricks.	2
	II	**Flooring materials:** Functional requirement of flooring, types of floor Finishes and their suitability, construction details for concrete, tiles and stone flooring.	4
	III	**Roofing materials –** Galvanized iron pre-coated aluminium sheets, fiber sheets, and Mangalore tiles. Roof construction: types and their suitability, method of construction, types of trusses, And types of shell structure.	4
2	I	**Doors, windows -** definition of technical terms, installation of doors and window frames and their size specifications, fixtures and fastenings and its types.	3
	II	**Arches and lintels-** principle of arch action, types of arches, method of arch Construction, centering and removal of centering. Lintels: necessity and types, chajja or Weather shade necessity and types.	4
3	I	**Properties Of Cement:** Manufacturing of Portland cement,	4

		Chemical composition of Portland cement, Hydration of cement and action of gypsum, Setting of cement, Physical and chemical test for cement as per IS:4031, IS:269. Different types of cement, Chemical composition, Important properties and applications, Admixtures.	
	II	**Properties Of Aggregates** Classification of aggregates, Physical properties, Mechanical properties.	4
4	I	**Fresh Concrete**: Workability, factors affecting workability, Measurement of workability by Various tests, Segregation and bleeding of concrete, Mixing, transportation and placing of concrete. Compaction of concrete, Ready mixed concrete, Pumped concrete, Pre placed aggregate concrete and Vacuum processed concrete - Shotcrete and guniting.	4
	II	**Mix Design**: - Definition and need for designing mixes - Methods of mix design - IS method of mix design in detail with examples.	4
	III	**Special Concrete**: Use of fly ash, Silica Fume, GGBS, Met kaolin, Plasticizers in Concrete. Self-Compacting concrete, Pumpable concrete, High Density concrete, High Performance concrete, Fiber Reinforced Concrete, Light Weight Concrete, Polymer Concrete.	2
5	I	**Strength Of Concrete**: Factors affecting strength of concrete, Different methods of Curing, Steam Curing at Atmospheric Pressure and High Pressure Curing-Warm water method.	5
	II	**Testing of Hardened Concrete**: Need for testing, Compression test – Cube, cylinder - Prism and equivalent cube test, Effects of various factors on test results e.g. end conditions, Flexure test, Split tensile test. Non-destructive testing needs and applications, Rebound hammer test, Ultrasonic Pulse Velocity test.	5
		Total No. of Hrs	**45 Hrs**

Beyond the Syllabus
1. Concrete Mix Design Workshop for Students. 2. Ferro Cement and its Application.

Course Outcome	
Students should able to	
CO1	Identify types of building and basic requirements of building components.
CO2	Understand chemistry, properties and classification of cement, aggregates, concrete.
CO3	Understand the tests on fresh and hardened concrete using different methods.
CO4	Design concrete mix of desired grade concrete as per IS specifications.
CO5	Understand special types of concrete used in field.

List of Experiments	
Sr. No.	**Description**
(A)	**Cement**
1	Fineness of cement by dry sieving method
2	Standard consistency of cement
3	Setting time and Soundness of Cement
4	Compressive strength of Cement mortar
(B)	**Fine and Coarse Aggregates**
5	Fineness modulus and grading of fine and coarse aggregate
6	Moisture content, silt content, density and Specific gravity of fine aggregate
7	Moisture content , water absorption, density and Specific gravity of coarse aggregate
(C)	**Concrete mix design by I. S. 10262-2009.** (Using software as well as manually)
(D)	**Fresh & Hardened Concrete**
8	Workability of concrete by slump test, compaction factor, Vee -Bee test.
9	Cube Compressive Strength of concrete
10	Split tensile strength of concrete
11	Flexural strength of concrete
12	NDT test by Rebound hammer or Ultrasonic Pulse velocity method.
(E)	**Site Visit:** i) Ongoing Concrete work to understand the overall process of concreting, (ii) Ready Mix Concreting, (iii) Concreting with Modern Equipments.

Recommended Resources	
Text Books	1. . Building Construction by B.C. Punmia, Laxmi Publications. 2. Building Materials by S.V.Deodhar, Khanna Publication. 3. Building Construction by Bindra and Arora, Dhanpat Rai Publications. 4. Civil Engineering Materials by Neil Jackson & Ravindra K. Dhir, Palgrave Macmillan.
Reference Books	1. Building Materials by S. K. Duggal, New Age International Publishers. 2. Civil Engineering Materials by TTTI Chandigrah, Tata McGraw Hill Publications. 3. Materials of construction by D.N Ghose, Tata McGraw Hill. 4. Building Construction by S.C. Rangwala, Charotdar Publications. 5. National Building Code of India. 6. The construction of buildings; seventh edition, Vol.1 & Vol.2 by R. Barry, Oxford: Blackwell Science. 7. Building Materials Technology by Ruth T. Brantley & L. Reed Brantley, Tata McGraw Hill. 8. Properties of Concrete by A. M. Neville, Pearson Education Limited. 9. Mitchell's Advanced Building Construction: The Structure by J. Stroud Foster
E-Resources	1. http://nptel.ac.in/Concretetech

SANDIP UNIVERSITY

School of Engineering and Technology

Civil Engineering Department

Year: S.E B.Tech. **Semester: III**

Course : Surveying **Course Code: 17 YCE302**

Teaching Scheme (Hrs/Week)				Continuous Internal Assessment (CIA)					End Semester Examination		Total
L	**T**	**P**	**C**	**CIA-1**	**CIA-2**	**CIA-3**	**CIA-4**	**Lab**	**Theory**	**Lab**	
3	**0**	**2**	**4**	10	20	10	10	-	100	25	**125**
Max. Time, End Semester Exam (Theory) - 3 Hrs.									**End Semester Exam (Lab) - 3Hrs.**		

Prerequisite	1. **Basic knowledge of trigonometry** **2. Basic CAD** **3. Physical fitness of Student**

Course Objectives	
1	To introduce to students the theory and application of surveying
2	To make the students well understand the fundamentals of surveying knowledge and being familiar with various aspects of surveying practice.
3	To develop the ability to adopt and apply techniques, skills and modern engineering tools necessary for field surveying.
4	To provide practical based learning to use instruments for field surveying.
5	To introduce to students the theory and application of surveying

Course Content			
Unit No.	Module No.	Content	Hours
1	I	**Introduction to Surveying:** Definition, objectives, uses, fundamental classification of survey, principles of surveying, scale and types of scale, different instruments used in surveying and its uses.	4
	II	**Plane Table Survey:** Definitions, Plane table accessories, Errors, Advantages & Disadvantages, Methods of plotting – Radiation, Intersection, Traversing and resection.	6
2	I	**Linear Measurement:** Distance measurement: Methods, Equipment, Tape, Ranging, and EDM for linear measurement, Errors in measurement.	5
	II	**Angular measurement**: Prismatic Compass: Construction and uses, meridians, bearings, local attraction, dip and declination. Theodolite: Types, Parts of theodolite, temporary adjustment, permanent	5

		adjustments, Measurements of horizontal angles (methods of repetition and reiteration) and measurement of vertical angles, errors in measurements.	
3	I	**Levelling & Contouring**: Definitions, Instruments, Types of levels, Datum, types of bench marks, methods of levelling, Trigonometric Levelling-Definition and types, R.L. computations by Collimation Method and Rise-Fall Method, correction for curvature & Refraction. Auto levelling principle and its advantages	6
	II	**Profile levelling :** Definition cross sectioning, Contour-characteristics, methods of plotting contour, methods of contouring, uses of contour maps, tacheometric contouring.	4
4	I	**Traverse Survey:** Types of traverse, Open and closed traverse, Theodolite traverse – Field work, Latitude, departure, Coordinate system of traverse, adjustment of closed traverse by transit rule and Bowditch's rule, Gales traverse table, General method of calculating area and volume.	8
5	I	**Modern surveying equipment's:** Introduction to total station, GIS, Remote sensing, applications of remote sensing and GIS, traverse survey by total station, maps	7
		Total No. of Hrs	**45 Hrs**

Beyond the Syllabus
1. Robotic Total Station and Advance GPS system demonstration to students.

Course Outcome	
Students should able to	
CO1	Operate and use surveying equipment
CO2	Draw plan or map of the existing permanent features on the ground.
CO3	Classify the ground features from the map or plan.
CO4	Analyse temporary adjustments and check permanent adjustments of the Theodolite
CO5	Understand concept of Levelling

List of Experiments	
1	Plane table survey by method of Radiation/ Intersection
2	Measurement of bearings using prismatic compass
3	Simple and differential levelling – Plane of collimation and Rise and Fall method
4	Determination of horizontal and vertical distance using tacheometer.
5	Measurement of horizontal angle and vertical angle by repition method by using 20" theodolite
6	Measurement of horizontal, vertical angle and distance by using total station.
7	Setting out building Layout using foundation plan.
8	Project I: Tachometric contouring project on hilly area.
9	Project II: Road Project using Auto level for minimum 100m length
10	Project III: Traversing using total station.

Recommended Resources	
Text Books	1. R. Subramanian, Surveying and Leveling, Oxford University. 2. B. C. Punmia, A. K. Jain & A. K. Jain, Surveying Vol. I, Laxmi Publications.
Reference Books	1. M. Chandra, Plane Surveying, New Age International. 2. S. K. Duggal, Surveying Vol. I, Tata Mcgraw-Hill. 3. T. P. Kanetkar & S. V. Kulkarni, Surveing & Levelling-Part I, Pune Vidhyarthi Griha Prakashan. 4. N. N. Basak, Surveying.
E-Resources	1. http://nptel.ac.in.

SANDIP UNIVERSITY

School of Engineering and Technology

Civil Engineering Department

Year: S.E B.Tech. **Semester: III**

Course : Fluid Mechanics **Course Code: 17 YCE303**

Teaching Scheme (Hrs/Week)				Continuous Internal Assessment (CIA)					End Semester Examination		Total
L	T	P	C	CIA-1	CIA-2	CIA-3	CIA-4	Lab	Theory	Lab	
3	0	2	4	10	20	10	10	25	100	25	150
Max. Time, End Semester Exam (Theory) - 3 Hrs.									End Semester Exam (Lab) - 3Hrs.		

Prerequisite

1. **Basic knowledge of fundamental SI units**
2. **Basic Mathematics**

Course Objectives	
1	To understand conceptually the properties of fluids and the fluid pressure, various fluid pressure measuring devices and the fluid pressure on surfaces and the concept of metacentric height
2	To understand the basic concept of fluid kinematics and fluid dynamics – Continuity Equation & Energy Equation
3	To study the various velocity and discharge measuring arrangements through tanks, pipes and open channel
4	To understand the basic concept of dimensional analysis and important dimensionless parameters.

Course Content			
Unit No.	Module No.	Content	Hours
1	I	**Introduction and Properties of fluids:** **a)Fluid & Its Properties :**Definition of fluid, Physical properties of fluid – Density, Specific Weight, Specific Volume, Specific Gravity, Classification of fluid, Newton's law of viscosity – Dynamic & Kinematic Viscosity, Compressibility and Bulk Modulus, Surface Tension and Capillarity, Vapour Pressure and Cavitation.	5
	II	**b) Pressure and Its Measurement :** Pascal's Law, Hydrostatic Law of Pressure Variation, Absolute, Gauge, Atmospheric and Vacuum Pressure, Piezometer, Manometers – Simple, Differential, Inverted U tube Differential, Micro Manometer, Mechanical Gauges – Diaphragm, Bourdon Tube, Dead Weight & Bellows Pressure Gauge, Single Column Manometers	5
2	I	**Fluid Statics:** **a) Hydrostatic Forces on Surfaces :** Hydrostatics pressure and center of pressure on plane and curved surfaces. Total Pressure and	5

		center of pressure on Lock gates	
	II	**b) Buoyancy & Floatation :**Archimedes principle, concept of buoyancy, center of buoyancy, Stability of Submerged Bodies, Metacenter, Stability of floating body, Determination of metacentric height analytical and experimental method	5
3	I	**Fluid Kinematics :** Eulerian and Lagrangian approaches of fluid motion, velocity and acceleration, classification of fluid flows based on space & time, one-, two- and three- dimensional flows, stream lines, path lines and streak lines, stream tubes, Continuity Equation on Cartesian coordinates, velocity potential, stream function, flow net. velocity and acceleration of fluid particle, Concept of Forced and Free Vortex Flow	7
4	I	**Fluid Dynamics :** Euler's equation, Bernoulli's Equation (or Energy equation) by integration of Euler's equation, Momentum equation, Use of Momentum Equation for finding out the forces in pipe, Energy Correction Factor and Momentum Correction Factor, Hydraulic Coefficients, Determination of Hydraulic Coefficients, Orifices and Mouthpieces, Sharp Crested Orifice, Small and Large Orifice, External & Internal Mouth Pieces, Pitot Tube, Time of emptying a tank through orifice, Measurement of Flow through Pipe : Venturi-meter, Orifice meter	8
5	I	**Flow through Notches and Weirs:** Classification of Notches and Weirs, Types of Notches & Weirs - Rectangular, Triangular, Trapezoidal, Stepped, Effect on Discharge due to error in Measurement of Head, Cipolleti Weir. Effect of Velocity of Approach, End Contraction, Broad Crested Weir, Narrow Crested Weir, Ogee Weir	5
	II	**b) Dimensional Analysis:** Dimensions of physical quantities, dimensional homogeneity, dimensional analysis using Buckingham's π theorem method, geometric kinematic and dynamic similarity, and important dimensionless parameters.	5
		Total No. of Hrs	45

Beyond the Syllabus
1. Knowledge of Notches & Weirs.

Course Outcome	
Students should able to have knowledge of	
CO1	Various properties of fluid, its pressure, pressure measurement and the pressure exerted by the fluid on different surfaces
CO2	Stability of submerged and floating body
CO3	Fluid Kinematics & Dynamics – Use of Continuity Equation & Energy Equation in fluid

	flow problems
CO4	Measurement of velocity and discharge through tank, pipe and open channel
CO5	Dimensional Analysis and Dimensionless Parameters

List of Experiments	
1	Measurement of Viscosity by Redwood Viscometer
2	Measurement of pressures using different pressure measuring Devices
3	Determination of stability of floating bodies using ship models
4	Measurement of Discharge and Average Velocity of Flow through Pipe
5	Study of Laminar flow using Reynolds Apparatus
6	Experimental verification of Bernoulli's theorem
7	Calibration of Venturimeter
8	Calibration of Orificemeter
9	Determination of Cv, Cd and Cc of an orifice by Jet Distance Measurement Method
10	Calibration of Rectangular Notch
11	Calibration of Triangular Notch
12	Study of flow net by electrical anology for flow below weir

Recommended Resources	
Text Books	1. Jain A K, "Fluid Mechanics including Hydraulic Machines", Khanna Publishers, New Delhi, 2000. 2. R.K.Bansal, Fluid mechanics and Hydraulic machines, Laxmi Publications (P) Ltd., New Delhi, 2012. 3. R. K. Rajput, "Fluid Mechanics", S. Chand Publications P.N.Modi and S.M.Seth, Hydraulics and Fluid Mechanics including Hydraulic Machines, Standard Book House, Delhi,16th Edition, 2007
Reference Books	1. Garde R. J. and Mirajgaoker A. G. "Engineering Fluid Mechanics", Scitech Publications(India)Pvt. Ltd., Chennai, 2003. 2. Asawa G L, "Fluid Flow in Pipes and Channels", CBS Publishers, New Delhi, 2008. C.S.P. Ojha, R. Berndtsson and P. N. Chandramouli, "Fluid Mechanics and Machinery", Oxford University Press.
E-Resources	

SANDIP UNIVERSITY

School of Engineering and Technology

Civil Engineering Department

Year: S.E B.Tech. **Semester: III**

Course : Mechanics of Materials **Course Code: 17 YCE304**

Teaching Scheme (Hrs/Week)				Continuous Internal Assessment (CIA)					End Semester Examination		Total
L	**T**	**P**	**C**	**CIA-1**	**CIA-2**	**CIA-3**	**CIA-4**	**Lab**	**Theory**	**Lab**	
3	**0**	**2**	**4**	10	20	10	10	25	100	25	**150**
Max. Time, End Semester Exam (Theory) - 3 Hrs.									**End Semester Exam (Lab) - 3Hrs.**		

Prerequisite	1. **Basics of Engineering Mechanics** 2. **Basics of Mathematics**

Course Objectives	
1	To study the different types of stresses due to load, temperature, etc.
2	To learn concept of Shear Force and Bending Moment Diagram for determinate beams.
3	To learn how to find out load carrying capacity of exixting coloum and to analysis new columns.

Course Content			
Unit No.	Module No.	Content	Hours
1	I	**Simple Stresses and Strains:** Concept of structure- Determinate and indeterminate. Concept of axial and shear force. Concept of normal and shear stress. Concept of linear, lateral and shear strain. Elasticity, Elastic limit, Hooke's law, Poisson's ratio, Equation for axial deformation. Determination of axial deformation of stepped bars and drawing AFD. Analysis of parallel bars in composite section. Volumetric Strain.	5
	II	**Two and Three dimensional stress system-** Generalized Hooke's law. Various elastic constants like bulk modulus, shear modulus. Different relations among various elastic constants like Modulus of elasticity, Poisson's ratio, bulk modulus, shears modulus. Indeterminate bars with and without yielding of support.Temperature stresses in bar.	5
2	I	**Shear Force and Bending Moment Diagram:** Definition of beam – determinate and indeterminate. Types of supports, their reactions. Types of beams. Ways of load application. Concept of shear force, shear force diagram, Point of contra shear and its location. Concept of bending moment, bending moment diagram, Point of contra flexure and its location.	5
	II	**Concept of sagging and hogging BM**. Drawing SFD and BMD for	4

		simple, cantilever and compound beams. Relation between shear force, bending moment and intensity of loading. Deriving load diagram from SFD and BMD.	
3	I	**Bending and Shear Stresses in Beams:** Concept of pure bending. Assumptions in theory of pure bending, Neutral axis. Division of beam into tension and compression zones. Derivation of flexure formula, Determination of moment of inertia of compound sections. Drawing bending stress distribution diagrams. Moment of Resistance of cross-section and sectional modulus	5
	II	**Force on partial cross sectional area** and its contribution towards moment of resistance. Concept of longitudinal shear, derivation of shear stress formula, shear stress distribution for various cross sections, maximum and average shear stress over cross section of a beam. Designing shear connectors.	5
4	I	**Torsion and Principal Stresses: Torsion:** Torsion of circular shafts: theory of pure torsion, assumptions, derivation of torsion formula. Stresses, Torsion formula applied to determinate and indeterminate shafts in series and in parallel subjected to twisting moments. Power transmitted by shafts, twisting moment diagrams.	4
	II	**Principal Stresses**: General, Objective, Initial states of stress like uniaxial stress, biaxial stress, pure shear and General state i.e. .biaxial stress accompanied with shear stress. Resolving general state of stress for normal and shear stresses on an oblique plane. Principal stresses and principal planes. Maximum shear stress. (Analytical approach only)	4
5	I	**Columns and Footings**: Axially loaded columns: concept of critical or buckling load, assumptions, Euler's formula for buckling load with hinged ends, equivalent length for various end conditions, Limitations of Euler's equation. Factor of safety, safe load.	4
	II	**Rankine's formula.** Direct and bending stresses. Eccentric loading and stress analysis for axial load, uniaxial bending and biaxial bending, No tension condition, Limiting eccentricity, Core of section.	4
		Total No. of Hrs	**45**

Beyond the Syllabus
1. Analysis of Frame structure using software 2. Problem solving using MS office.

Course Outcome	
Students should able to	
CO1	Analyse the materials and determine the basic properties.
CO2	Determine the shear force and bending moments required for structural analysis and design
CO3	Determine the shear and bending stresses and their importance in structural analysis and design
CO4	Determine the torsional and Principal stresses required for structural analysis and design
CO5	Determine the critical loads for long and short columns

List of Experiments	
1	Tension test on mild and TMT steel
2	Shear test on mild and TMT steel
3	Torsion test on mild steel and aluminium
4	Izod and Charpy impact test on mild steel, brass aluminium and copper.
5	Compression test on timber (parallel and perpendicular grain)
6	Bending test on timber and plywood.
7	Water absorption, Efflorescence test on bricks
8	Compressive strength test on bricks
9	Flexural strength of flooring and roofing tiles.
10	Abrasion test of flooring tiles.

Recommended Resources	
Text Books	1. Strength of Materials - F.L. Singer and Andrew Pyt Ltd, Harper and Row Publication Strength of Materials – R. Subramanian, Oxford University Press. 2. Mechanics of Structures – TimoShenko and Young, East-West Press Ltd.
Reference Books	1. Strength of MaterialsD. Ghosh , A.K.Datta--- New Age International Publishers. 2. Mechanics of Materials- Beer and Johnston, McGraw Hill Publication. 3. Introduction to Mechanics of Solids- E.P. Popov, Prantice Hall Publication. 4. Strength of Materials- S.S. Ratan, Tata McGraw Hill Strength of Materials – Ramamrutham. 5. Strength of Materials – Er. R K Rajput.
E-Resources	1. http://nptel.ac.in.

SANDIP UNIVERSITY

School of Engineering and Technology

Civil Engineering Department

Year: S.E B.Tech. **Semester: III**

Course : Statistics, Probability and Vector Calculus **Course Code:** Common

Teaching Scheme (Hrs/Week)				Continuous Internal Assessment (CIA)					End Semester Examination		Total
L	**T**	**P**	**C**	**CIA-1**	**CIA-2**	**CIA-3**	**CIA-4**	**Lab**	**Theory**	**Lab**	
3	**0**	**2**	**4**	10	20	10	10		100		**100**
Max. Time, End Semester Exam (Theory) - 3 Hrs.									**End Semester Exam (Lab) - 3Hrs.**		

Prerequisite 1**. Basics of Mathematics**

Course Objectives	
1	To solve n^{th} order Linear differential equations
2	To understand the applications of ODE and PDE
3	To understand the basic concepts of statistics and probability
4	To understand the concepts of vector differential calculus
5	To understand the concepts of vector integral calculus and their applications

Course Content			
Unit No.	Module No.	Content	Hours
1	I	**Linear Differential Equations (LDE):** Solution of nth order LDE with constant coefficients, method of variation of parameters, symmetric simultaneous differential equations.	5
	II	**Partial Differential Equations (PDE):** Solution of PDE of first and second order by variable separation method, Lagrange's linear differential equations.	5
2	I	**Statistics:** Measures of central tendency, standard deviation, coefficient of variation, correlation and regression, reliability of regression estimates.	6
3	I	**Probability:** Revision of probability theorems and properties of probability, probability density function, probability distributions: Binomial, Poisson and Normal distributions, chi-square test.	7
4	I	**Vector Differential Calculus :** Physical interpretation of vector differentiation, vector differential operator, gradient, divergence and curl, directional derivative, solenoidal, irrotational and conservative fields, scalar potential, vector identities	9
5	I	**Vector Integral Calculus:** Line, surface and volume integrals, work-done, Green's lemma, Gauss's divergence theorem, Stoke's theorem, applications to problems in fluid mechanics, continuity equations, stream lines, equations of motion, Bernoulli's equations.	8
		Total No. of Hrs	**40 Hrs**

Course Outcome	
Students should able to	
CO1	Solve linear differential equations and partial differential equations
CO2	Interpret sampling methods to perform statistical data analysis
CO3	Understand probability distribution
CO4	Solve the problems on vector derivatives and integrations.
CO5	Apply vector calculus to solve the problems in engineering fields as fluid mechanics

Recommended Resources	
Text Books	**1.** Ervin Kreyszig, Advanced Engineering Mathematics, 10th edition, John Wiley and Sons. **2.** B. S. Grewal, Higher Engineering Mathematics, 43rd edition, Khanna Publishers.
Reference Books	1. Advanced Engineering Mathematics, 2e, by M. D. Greenberg (Pearson Education). 2. Advanced Engineering Mathematics, Wylie C.R. & Barrett L.C. (McGraw-Hill, Inc.) 3. Peter V. O'Neil, Advanced Engineering Mathematics, 7th edition, Cengage Learning

SANDIP UNIVERSITY

School of Engineering and Technology

Civil Engineering Department

B.Tech

CIVIL ENGINEERING DEPARTMENT

IV Semester

SANDIP UNIVERSITY

School of Engineering and Technology

Civil Engineering Department

Year: S.E B.Tech. **Semester: IV**

Course : Advanced Fluid Mechanics **Course Code: 17 YCE401**

Teaching Scheme (Hrs/Week)				Continuous Internal Assessment (CIA)					End Semester Examination		Total
L	**T**	**P**	**C**	**CIA-1**	**CIA-2**	**CIA-3**	**CIA-4**	**Lab**	**Theory**	**Lab**	
3	**0**	**2**	**4**	10	20	10	10	25	100	25	**150**
Max. Time, End Semester Exam (Theory) - 3 Hrs.									**End Semester Exam (Lab) - 3Hrs.**		

Prerequisite 1**. Basics of Fluid Mechanics.**

Course Objectives	
1	To understand Laminar & Turbulent flow.
2	To understand characteristics of flow through pipe.
3	To impart knowledge Boundary Layer theory.
4	To understand Depth-Energy Relationships in Open Channel Flow.
5	To understand knowledge of hydraulic jumps.

Course Content			
Unit No.	Module No.	Content	Hours
1	I	**Laminar Flow :** Flow of viscous fluid through circular pipes and two parallel plates, Power absorbed in Viscous Flow, Loss of Head due to Friction	5
	II	**Turbulent Flow :** Frictional Loss in Pipe Flow (Darcy Weisbach Equation), Shear Stress in Turbulent Flow, Velocity Distribution in Turbulent Flow, Hydro-dynamically Smooth and Rough Pipe	5
2	I	**Flow through Pipe :** Loss of Energy in Pipe due to friction (Major Loss) and fittings (Minor Loss), Hydraulic Gradient Line & Total Energy Line, Flow through pipes in Series and Parallel, Flow through Syphon, Flow through Branched Pipes (Three Reservoir Problem), Power Transmission through Pipes, Water Hammer Phenomenon – Rigid & Elastic Column Theory (Sudden & Gradual Closure of Valve)	5
3	I	**Boundary Layer Theory :** Development of Boundary Layer over a flat plate, Laminar & Turbulent Boundary Layer, Laminar Sub Layer, Thickness of Boundary Layer – Nominal, Displacement, Momentum and Energy Thickness, Drag Force on Flat Plate due to Boundary Layer, Separation of Boundary Layer,	5

	II	**Fluid Flow around Submerged Objects:** Force exerted by flowing fluid on a stationary body, Expression for Drag and Lift, Different types of Drag forces, Practical problems involving fluid flow around submerged objects, Lift on an aerofoil	5
4	I	**Uniform Flow in Open Channel**: Classification of channels, and types of flow in channel. uniform flow formulae : Chezy's and Manning's formulae; Factors affecting Manning's roughness coefficient; Geometric elements of channel - Rectangular, Triangular, Trapezoidal.	5
	II	**Depth-Energy Relationships in Open Channel Flow**: Specific energy, Specific force Specific energy diagram, Specific force diagram, Depth discharge Diagram, Critical depth, Conditions for occurrence of critical flow; Froude's number. **Hydraulic Jump**-Phenomenon of hydraulic jump; Location and examples of occurrence of hydraulic jump; Assumptions in the theory of hydraulic jump; Energy dissipation in hydraulic jump; Classification of hydraulic jump; Practical uses of hydraulic jump	5
5	I	**Impact of Jet:** Force and work done due to impact of jet on stationary and moving, flat and curved surfaces using linear momentum principle.	5
	II	**Hydraulic Turbines** - Classification, heads and efficiencies, Pelton Wheel, Francis Turbine & Kaplan Turbine, Draft Tube **Centrifugal Pump** – Main Parts, Work done by the impeller on water, Heads and Efficiencies	5
		Total No. of Hrs	**45 Hrs**

Beyond the Syllabus
1. **Basic Knowledge of Turbine.**

Course Outcome	
Students should able to	
CO1	Student will be able to understand concept of boundary layer theory.
CO2	Student will be able to understand Fluid Flow around Submerged Objects and Unsteady Flow.
CO3	Student will be able to understand Depth-Energy Relationships in Open Channel Flow.
CO4	Student will be able to analyze flow through pipes, turbines and pumps.
CO5	Student will be able to understand concept of Uniform flow in open channels and hydraulic Jump

List of Experiments	
1	Determination of Darcy-Weisbach friction factor for given pipes.
2	Determination of Minor Loss Coefficient in Pipe Fittings
3	Determination of Manning's or Chezy's constant for an open channel.
4	Developing specific energy diagram for a rectangular channel bodies.
5	Study of hydraulic jump in a horizontal rectangular channel.
6	Study of flow around immersed bodies – Circular Cylinder
7	Study of flow around immersed bodies – Aerofoil – Drag & Lift
8	Study of Impact of Jet.
9	Study of Peloton Wheel turbine.
10	Study of Francis turbine.
11	Study of Kaplan turbine.
12	Study of Centrifugal pump.

Recommended Resources	
Text Books	2. Garde R.J. and Mirajgaokar A.G.; Engineering Fluid Mechanics Scitech Publication 2003. 2. 3. Subramanya K., Theory and Applications of Fluid Mechanics, Tata McGraw Hill Publication, 1996.
Reference Books	4. Streeter V.L. and Wyle E.B.; Fluid Mechanics; International Students Edition, 1986. 2. 5. Modi S.M. and Seth S.M.; Hydraulics and Fluid Mechanics including Hydraulic Machines; PHI learning Pvt.Ltd.2015
E-Resources	1. http://nptel.ac.in.

SANDIP UNIVERSITY

School of Engineering and Technology

Civil Engineering Department

Year: S.E B.Tech. **Semester: IV**

Course : Structural Analysis - I **Course Code: 17 YCE402**

Teaching Scheme (Hrs/Week)				Continuous Internal Assessment (CIA)					End Semester Examination		Total
L	**T**	**P**	**C**	**CIA-1**	**CIA-2**	**CIA-3**	**CIA-4**	**Lab**	**Theory**	**Lab**	
3	**0**	**2**	**4**	10	20	10	10	-	100	-	**100**
Max. Time, End Semester Exam (Theory) - 3 Hrs.									**End Semester Exam (Lab) - 3Hrs.**		

Prerequisite	1. **Basics of Engineering Mechanics and Mechanics of Material.** **2. Basics of Engineering Mathematics.**

Course Objectives	
1	To understand the basics configuration and classification of structures.
2	To analyze the determinate and indeterminate structures.

Course Content			
Unit No.	Module No.	Content	Hours
1	I	**Fundamentals of structure, slope and deflection.** Types and classification of structures based on structural forms, concept of indeterminacy, static and kinematics degree of indeterminacy.	5
	II	**Strain energy, Castigliano's first theorem**, application to determine slope and deflection of determinate beams and frames.	5
2	I	**Slope Deflection Method:** Slope and deflection of determinate beams by Macaulay's method, concept of moment area method and conjugate beam method and its application.	5
	II	**Derivation of slope deflection equations**, Analysis of statically indeterminate beams and rectangular portal frames (two dimensional structures) with and without sway using slope deflection method (Up to three unknowns), Application of modified slope deflection equations, Drawing SFD and BMD on tension side	5
3	I	**Moment Distribution Method:** General, Absolute stiffness, Modified stiffness, Carry over factor, Distribution factor. Analysis of statically indeterminate beams and rectangular portal frames (two dimensional structures) with and without sway using moment distribution method, Drawing SFD and BMD on tension side.	8
4	I	**Influence line diagram:** Basic concept, Muller-Breslau's principle, and influence line diagram for reaction, shear and moment to simply supported and overhanging beams, application of influence line diagram to determine reaction, shear and moment in beams.	5

	II	**Influence line diagram for axial force in trusses**, application of influence line diagram to determine of axial forces in the members of plane determinate trusses under dead load and live load.	4
5	I	**Analysis of arches:** Three hinged arches: Concepts, types of arches, analysis of parabolic arch with supports at same and different levels, semicircular arches with support at same level, determination of horizontal thrust, radial shear and normal thrust for parabolic and circular arch.	4
	II	**Two hinged arches:** analysis of parabolic and semicircular arches with supports at same level, determination of horizontal thrust, radial shear and normal thrust.	4
		Total No. of Hrs	**45 Hrs**

Beyond the Syllabus
1. Analysis using software.

Course Outcome	
Students should able to	
CO1	Understand the basic concept of static and kinematic indeterminacy.
CO2	Students will be able to analyze determinate and indeterminate structures using Slope Deflection method.
CO3	Students will be able to analyze determinate and indeterminate structures using Moment Distribution Method
CO4	Students will be able to apply influence line diagrams for the analysis of structures.
CO5	Students will be able to analyze two and three hinged arches.

Recommended Resources	
Text Books	**1.** Structural Analysis: A matrix approach by G.S. Pandit and S. P. Gupta, Tata Mc Graw Hill. **2.** Structural Analysis: A Matrix Approach by Pandit and Gupta, McGraw Hills. Theory of Structures – S Ramamrutham. **3.** Structural Analysis Vol-1, third edition, By S S Bhavikatti, Vikas publishing House, PVT, LTD. **4.** Theory of Structures – VaziraniRatwani
Reference Books	**5.** Mechanics of Structures Vol. II by S B Junnarkar and Dr. H J Shah, Twenty second edition, Charotar Publishing House Pvt. Ltd. **6.** Structural Analysis: Deodas Menon--Narosa Publishing House. **7.** Theory of Structures: Vol. I by B. C. Punmia, Laxmi Publication. **8.** Theory of Structures: Vol. II by B. C. Punmia, Laxmi Publication
E-Resources	1. http://nptel.ac.in.

SANDIP UNIVERSITY

School of Engineering and Technology

Civil Engineering Department

Year: S.E B.Tech. **Semester: IV**

Course : Geotechnical Engineering (MB) **Course Code: 17 YCE403**

Teaching Scheme (Hrs/Week)				Continuous Internal Assessment (CIA)					End Semester Examination		Total
L	T	P	C	CIA-1	CIA-2	CIA-3	CIA-4	Lab	Theory	Lab	
3	0	2	4	10	20	10	10	25	100	25	150
Max. Time, End Semester Exam (Theory) - 3 Hrs.									End Semester Exam (Lab) - 3Hrs.		

Prerequisite 1. **Basics of Engineering Mechanics**

Course Objectives	
1	To develop skills in dealing with soil as a construction material or as load carrying component of an engineering structures.
2	To develop an understanding of the behaviour of foundations for engineering structures and to gain knowledge of the design that can be applied to practical problems
3	To understand and able to apply modelling and analysis techniques used in soil mechanics (a)Darcy's Law and Flow net for seepage; (b) Consolidation models for load time deformation responses of soil.
4	To compute lateral earth pressure & factor of safety of stable slopes

Course Content			
Unit No.	Module No.	Content	Hours
1	I	**Introduction and Index Properties of Soil** Need for soil engineering studies, complexity of soil, historical development, and regional soil deposits in India. Solids-water-air relationships & Index properties: Phase diagram, relationships, water content determination, specific gravity of solids determination, In-situ determination of density - relative density, grain shape, Index properties – grain size distribution and consistency of clays: Atterberg Limits, activity.	6
	II	**Classification of soils:** Unified Soil Classification System, AASHTO classification system, Indian Standard soil classification system and textural classification of soils, plasticity chart Soil structure and clay minerals: Clay minerals, clay particle interaction, soil structure and fabric, specific surface, granular soil structure	6
2	I	**Permeability:** Darcy's law, Laboratory and Field tests to determine coefficient of permeability. Permeability of layered soil Seepage and Seepage Pressure, quick sand phenomenon, critical hydraulic	6

		gradient, General flow equation for 2-D flow (Laplace equation),	
	II	**Flow Net**, properties and application, Flow Net construction for flow under sheet pile and earthen dam	4
3	I	**Engineering Properties of Soil Compaction:** Factors affecting compaction, laboratory tests, compaction in field, compaction specifications and field control.	5
	II	**Consolidation:** Fundamentals of consolidation, consolidation parameters, one dimensional laboratory consolidation test, time rate of consolidation. Vertical stress below applied loads: Boussinesq equations, vertical stress beneath loaded area, New Mark's influence chart, approximate distribution methods, Westergaard's solution	5
4	I	**Shear Strength of Soil. Introduction** – Shear strength an Engineering Property. Mohr's stress circle, Mohr Coulomb failure theory. The effective stress principle- Total stress, effective stress and neutral stress / pore water pressure. Peak and Residual shear strength, factors affecting shear strength	6
	II	**Stress-strain behavior of sands and clays**. Measurement of Shear Strength – Direct Shear test, Triaxial Compression test, Unconfined Compression test, Vane Shear test. Their suitability for different types of soils, advantages and disadvantages. Different drainage conditions for shear tests.	6
5	I	**Lateral Earth Pressure and Stability of slopes Lateral Earth Pressure**: Introduction, Active - Passive and Earth pressure at rest conditions.	6
	II	**Coulomb's - Rankine's theories** of earth pressure, Culman's graphical method. Stability of slopes: modes of slope failure, factor of safety, infinite slope - finite slope - Swedish method - Taylors stability number-Applications to design of earth dam	6
		Total No. of Hrs	**56 Hrs**

Beyond the Syllabus
1.

Course Outcome	
Students should able to	
CO1	Clasify soils and determine their physical characteristics such as grain size, water content, void ratio, and unit weight
CO2	Understand one- and two-dimensional flow of water through soils and be able to determine hydraulic conductivity, porewater pressures, and seepage stresses.
CO3	Determine the compaction of soils and be able to specify and monitor field compaction . Understand how stresses are distributed within soils from surface loads and the limitations in calculating these stresses. Be able to determine consolidation parameters and calculate one-dimensional consolidation settlement
CO4	Determine soil strength parameters from soil tests, for example, the friction angle and

	undrained shear strength
CO5	Determine the lateral earth pressure and understand stability of slopes

List of Experiments	
1	Determination of moisture content of soil.
2	Specific gravity determination by Pycnometer /density bottle.
3	Field density measurement
4	Sieve analysis.
5	Sedimentation Analysis.
6	Consistency limits of soil.
7	Compaction test on soil
8	Determination of coefficient of permeability of soil
9	Estimation of shear resistance of non-cohesive soil by direct shear test.
10	Estimation of shear resistance of cohesive soil by UCS tests.
11	Computation of consolidation parameters.
12	Vane Shear test.

Recommended Resources	
Text Books	**1.** Craig, R.F. "Craig's soil mechanics", Spon Press 2004. **2.** Holtz, R.D. & Kovacs, W.D., "An introduction to geotechnical engineering", Prentice Hall, 1981.
Reference Books	**3.** Mitchell, J.K. & Soga, K., "Fundamentals of soil behaviour", John Wiley & Sons, 2005. **4.** Ranjan, Gopal & Rao, A.S.R., "Basic and applied soil mechanics", New Age International Pvt. Ltd., 2004.
E-Resources	1. http://nptel.ac.in.

Year: S.E B.Tech. **Semester: IV**
Course : Transportation Engineering-l **Course Code: 17 YCE404**

Teaching Scheme (Hrs/Week)				Continuous Internal Assessment (CIA)					End Semester Examination		Total
L	T	P	C	CIA-1	CIA-2	CIA-3	CIA-4	Lab	Theory	Lab	
3	0	2	4	10	20	10	10		100		100
Max. Time, End Semester Exam (Theory) - 3 Hrs.									End Semester Exam (Lab) - 3Hrs.		

Prerequisite	**1. Basics of Civil Engineering.** **2. Awareness regarding different modes of transportation.**

Course Objectives	
1	Need and influence of transportation in Nation building
2	To teach the students about the different transportation systems.
3	To teach the students different tunneling methods.
4	Describe the terminology of infrastructure services like railway, tunnels, docks and harbor and airport facilities.

Course Content			
Unit No.	Module No.	Content	Hours
1	I	**Infrastructure:** Scope of Transportation Engineering in National & Global development, Provisions made for various infrastructure sectors like Roads & Highways, Railways, Airports, Ports, Housing, and Energy & Power sector with reference to 12th Five Year Plan. Public Private Partnership (PPP) its advantages and disadvantages.	8
2	I	**Railways Engineering:** Merits of rail transportation, railway gauges and gauge problems, Cross section of permanent way and track components: Sleepers-functions and types,	4
	II	**Rails:** Coning of wheels and tilting of rails, rail cross sections, wear and creep of rails, rail fastenings. Points crossings and turnouts. Functions components, elements of points, types of crossings and turnouts.	5
3	I	**Tunnel Engineering:** Functions of tunnel, criteria for selection of size & shape of tunnels. Pilot tunnel, shaft, addit and portal, NATM TBM & Earth Pressure Balance Method of tunneling in soft soil,	4
	II	**Trenchless Tunneling:** Drilling & blasting method of tunneling including various operations like mucking, micro tunneling and trenchless tunneling.	4
4	I	**Water Transportation:** Introduction to harbours, Requirements of	7

		harbours and ports. Classification of harbors with examples, Selection of site for harbor, Various components of ports, harbor works, break waters, jetties, wharves, piers, berthing facilities, types and construction, dolphins, docks, transit sheds and warehouses, general layout, containers and container yard, layout and handling equipment	
5	I	**Airport Engineering:** Advantages and limitations of air transportation**,** Aircraft characteristics and their influence on airport planning, Airport planning: topographical and geographical features, air traffic characteristics, and development of new airports, factors affecting airport site selection, Characteristics of good layout, runway configuration, airport obstruction, location of terminal buildings, aprons and hangers. Zoning requirements regarding permissible heights of constructions and landing within the airport boundary.	4
	II	**Runways and taxiways:** Runway orientation, wind coverage, use of wind rose diagram, basic runway length, corrections for elevation, temperature and gradient as per ICAO and FAA recommendation. Airport classification by ICAO.	4
		Total No. of Hrs	**40 Hrs**

Beyond the Syllabus
1. Technical visits to railways, harbours, Docks and Airport.

Course Outcome	
Students should able to	
CO1	Understand the need and influence of transportation in Nation building
CO2	Describe the terminology of infrastructure services like railway, docks and harbor and airport facilities.
CO3	Understand different tunnelling techniques.
CO4	Analyze the factors influencing the site selection for railway, docks, harbour and airport facilities.
CO5	Describe and sketch railway, docks and harbor and airport components.

Recommended Resources	
Text Books	1.Construction Planning Methods & Equipment:Puerifoy –Tata MC Graw Hill
Reference Books	1.Saxena S.C. and Arora S. P., A course of railway engineering, DhanpatRai and sons, New Delhi 2. Railway Track Engineering: J.S.Mundrey,Tata McGraw Hill 3. Harbour,Dock & Tunnel Engineering:R. Srinivasan 4. Khanna and Arora, Airport planning & design, Nemchand Bros, Roorkee
E-Resources	1.http://nptel.ac.in.

SANDIP UNIVERSITY

School of Engineering and Technology

Civil Engineering Department

Year: S.E B.Tech. **Semester: IV**

Course : Architectural Planning & Design of Building **Course Code: 17 YCE405**

Teaching Scheme (Hrs/Week)				Continuous Internal Assessment (CIA)					End Semester Examination		Total
L	T	P	C	CIA-1	CIA-2	CIA-3	CIA-4	Lab	Theory	Lab	
3	0	2	4	10	20	10	10	25	100	25	150
Max. Time, End Semester Exam (Theory) - 3 Hrs.									End Semester Exam (Lab) - 3Hrs.		

Prerequisite	**1. Introduction of Building bye laws** **2. Necessity of Town Planning** **3. Concept of TDR**

Course Objectives	
1	To study different concepts in building design and drawing, building definition, types of building, principle of planning
2	To study Necessity of town planning, building rules, regulations and bylaws, building ventilation and air-conditioning, necessity of fire protection system, different building services with its importance

Course Content			
Unit No.	Module No.	Content	Hours
1	I	**Introduction to Building Design & Drawing** -Building definition and types of building as per occupancy, Planning and designing of residential buildings (load bearing or frame Structure), Principles of Architectural design relation between form and function, utility, aesthetics. Working drawings: - importance and use of all types of working drawings at site.	5
	II	**Architectural Drawing:** i) Line plan, ii) Developed Plan, iii) Elevation, iv) Section, Selection of scales for various drawings, dimensioning, abbreviations and conventions as per IS 962, Elements of perspective drawings, parallel and angular perspective of small building elements.	5
2	I	**Building bye laws and introduction to Green Buildings:** Necessity of bye-laws, plot sizes, road width, open spaces, floor area ratio (F.A.R.), concept of V.P.R. Marginal distances, building line : control line, height regulations, room sizes, Area calculations (built-up area, carpet area etc.), Rules for ventilation, lighting, Vertical circulation, Sanitation and Parking of vehicles.	5
	II	**Green buildings:** salient features, benefits, planning concepts (site selection, orientation, sun path and wind diagram etc.), Rating systems (LEED, GRIHA etc.)	5

3	I	**Town planning and legal aspects: Town Planning:** Necessity and evolution of town planning in India. Development plan and its importance, Objectives and Contents of DP, Land use zoning, Introduction to different zones of land in town planning, Requirements of various zones, Height zoning and Density zoning.	4
	II	**Legal Aspects :** Role of Plan sanctioning authority, 7/12 abstract, meaning of different terms of 7/12 abstract, Form 6 and its types, Concept of TDR, List of documents to be submitted to local authority, Procedure for seeking Commencement and Occupancy Certificate, Various NOCs required.	4
4	I	**Building Services: a) Noise and Acoustics –** Sound insulation, Acoustical defects, Reverberation time, Sabine's formula, sound absorbents, planning for good acoustics. **b) Ventilation –** Necessity of Ventilation, Natural ventilation: stack effect and wind effect, Thermal Insulation, Mechanical ventilation and its types, air conditioning systems.	4
	II	**c) Lighting –** Principles of day lighting, design of windows, artificial illumination, SC, ERC, IRC, Daylight factor, solar energy systems for lighting (BIPV). **d) Plumbing –** Water storage tanks at ground level and on terrace (capacity), Plumbing systems, and various types of traps, Fixtures and Fittings, Rain Water Harvesting etc. **e) Other services –** Telecommunication, Electrical, Smart services and Waste management etc.	5
5	I	**Planning of Public Buildings:** a) Functional requirements and planning of industrial buildings, commercial buildings, School, Colleges, Hostel, Auditorium, Restaurant/ Hotel building, Primary Health Center/ Hospital, Shopping complex, Sports complex, Vegetable market, Post office, Bank buildings etc. b) Dimensioned line plans of above public buildings	8
		Total No. of Hrs	**45 Hrs**

Beyond the Syllabus
1. Contents of Development plan, Preparation Process,

Course Outcome	
Students should able to	
CO1	Plan effectively various types of buildings according to their utility with reference to different codes.
CO2	Understand and resolve contemporary issues at multi-dimensional functional levels.
CO3	Improve the status of existing structures by proposing appropriate green measures.
CO4	Analyze the available primary or secondary data and plan different types of structures considering futuristic need of an area.

List of Experiments	
1. (a)	**Typical floor plans**. (Hand-Drawn & AutoCAD) Draw all detailed units of each floor of School of Engineering & Technology Sandip University
(b)	**Layout Plan –** Sandip Foundation Campus – (using Google Earth & AutoCAD) Showing Building Units, internal roads, other structures (if any) Compound walls, Entrance gate, open spaces
2 (a)	**Perspective Drawing – One Point Perspective** (Hand-Drawn in Sketch Book) 1. Cube 2. Staircase 3. L-Section 4. Classroom
(b)	**Perspective Drawing – Two Point Perspective** (Hand-Drawn in Sketch Book) 1. Cube 2. Staircase 3. Detached Housing 4. Garage
3	**Layout plan of Detached Housing showing (**Plans to be given to the students) 1. Water supply line plan from municipal connection to various required tap connections within project building 2. Drainage arrangements 3. Electrical layout
4	**Collection of Building Occupany Certificate, NOCs, other documents of their respective residencies and to make a report on the same.**
1. (a)	**Typical floor plans**. (Hand-Drawn & AutoCAD) Draw all detailed units of each floor of School of Engineering & Technology Sandip University
(b)	**Layout Plan –** Sandip Foundation Campus – (using Google Earth & AutoCAD) Showing Building Units, internal roads, other structures (if any) Compound walls, Entrance gate, open spaces
2 (a)	**Perspective Drawing – One Point Perspective** (Hand-Drawn in Sketch Book) 5. Cube 6. Staircase 7. L-Section 8. Classroom
(b)	**Perspective Drawing – Two Point Perspective** (Hand-Drawn in Sketch Book) 5. Cube 6. Staircase 7. Detached Housing 8. Garage
3	**Layout plan of Detached Housing showing (**Plans to be given to the students) 4. Water supply line plan from municipal connection to various required tap connections within project building 5. Drainage arrangements 6. Electrical layout

4	**Collection of Building Occupany Certificate, NOCs, other documents of their respective residencies and to make a report on the same.**

Recommended Resources	
Text Books	1. Building Drawing - M.G. Shah, C.M. Kale, S.Y. Patki - Tata Mcgraw Hills pvt. Ltd.New Delhi. 2. Y.S.Sane - Planning & Designing Building. 3. Building Science and Planning by Dr . S.V. Deodhar
Reference Books	1. Building Drawings with an integrated Approach to Built-Environment by M. G. Shah, C. M. Kale and S. Y. Patki, New Delhi, Tata McGraw Hill. (5th edition.) National Building Code (latest). 2. Building Design and construction by Frederick Merrit, Tata McGraw Hill. 3. Times Saver standards of Architectural Design Data by Callender, Tata McGaw Hill. 4. I.S. 962 – 1989 Code for Practice for Architectural and Building Drawings. 5. Development plan and DCP Rules of urban local body, New Delhi, Volume 12. Model building bye laws by MoUD, GoI.
E-Resources	1. http://nptel.ac.in.