

**PANDIT DEENDAYAL PETROLEUM UNIVERSITY GANDHINAGAR**  
**SCHOOL OF TECHNOLOGY**  
**COURSE STRUCTURE FOR B TECH IN CIVIL ENGINEERING**

Semester III			B TECH IN CIVIL ENGINEERING										
Sr No	Course code	Course name	Teaching Scheme					Examination Scheme					Total marks
			L	T	P	C	Hrs/wk	Theory			Practical		
								MS	ES	IA	LW	LE/Viva	
1.	MA 201T	Mathematics III	3	1	-	7	4	30	60	10	-	-	100
2.	CE201T	Surveying	3	-	-	6	3	30	60	10	-	-	100
	CE201P		-	-	2	1	2	-	-	-	25	25	50
3.	CE202T	Fluid Mechanics-I	3	-	-	6	3	30	60	10	-	-	100
	CE202P		-	-	2	1	2	-	-	-	25	25	50
4.	CE203T	Building Planning and Drawing	1	-	-	2	1	30	60	10	-	-	100
	CE203P		-	-	4	2	4	-	-	-	25	25	50
5.	CE204T	Building Construction and Materials	3	-	-	6	3	30	60	10	-	-	100
6.	CE205T	Structural Analysis -I	3	1	-	7	4	30	60	10	-	-	100
7.	CE206T	Engineering Geology	2	-	-	4	2	30	60	10	-	-	100
	CE206P		-	-	2	1	2	-	-	-	25	25	50
8.	CE 208P	CSSI	-	-	-	3	-	-	-	-	50	50	100
		TOTAL	18	2	10	46	30						1000

MS- Mid semester; ES- End semester; IA-Internal assessment; LW-Laboratory work; LE-Laboratory exam

PANDIT DEENDAYAL PETROLEUM UNIVERSITY GANDHINAGAR										
SCHOOL OF TECHNOLOGY										
MA201T Mathematics-III										
Teaching Scheme					Examination Scheme					
L	T	P	C	Hrs/Week	Theory			Practical		Total marks
					MS	ES	IA	LW	LE/Viva	
3	1	0	7	4	30	60	10	-	-	100

08

#### UNIT I

**Systems of linear equations** : Matrices , Matrix Operations, Special matrices, Elementary transformation, Elementary transformation, Rank, Introduction to systems of Linear Equations, Conditions for consistency of the system, Solution by Gauss and Gauss Jordan Elimination Method, Solving system of equation using inverse of a Matrix and Cramer's rule.

#### UNIT II

13

**Vector spaces:** Euclidean n - space, Linear Transformations from  $R^n$  to  $R^m$ ; Properties Linear Transformations from  $R^n$  to  $R^m$ , Matrices of General Linear Transformations, Similarity; Isomorphism, Vector space and Subspaces, Linear dependence and Independence; Basis Dimension, Row space; null space; column space and rank of a matrix, Rank and Nullity, Dimension Theorem, Inner product spaces, Eigen values and Eigen vectors, Inner products , Angle and Orthogonality in Inner Product Spaces, Orthonormal Bases; Gram-Schmidt process; Least squares approximation, Orthogonal Matrices, Eigen values and Eigen vectors, Diagonalization.

#### UNIT III

11

**Fourier Series:** Periodic functions, Euler's formulae, Dirichlet's conditions, expansion of even and odd functions, half range Fourier series, Parseval's formula, complex form of Fourier series.  
**Special Functions:** Power series method to solve the equation, Frobenius method for solution near regular singular points, Legendre's equation, Legendre polynomials, Rodrigue's formula, Bessel's equation and orthogonality.

#### UNIT IV

05

**Partial Differential Equations and its Applications:** Classification of partial differential equations, solutions of one dimensional wave equation, one dimensional unsteady heat flow equation in Cartesian and polar coordinates by variable separable method with reference to Fourier trigonometric series and by Laplace transform technique

**APPROXIMATE TOTAL 39 Hours**

#### References:

1. Higher Engineering Mathematics, R. K. Jain & S. R. K. Iyernagar.
2. E.Kreyszig, Advanced engineering mathematics (8th Ed.), John Wiley (1999)
3. Ordinary and Partial Differential Equations by M.D. Raisinghania, 8<sup>th</sup> edition, S. Chand Publication (2010)
4. H.Anton, Elementary linear algebra with applications (8th ed.), John Wiley (1995)
5. G.Strang, Linear algebra and its applications (4th Ed.), Thomson (2006)

PANDIT DEENDAYAL PETROLEUM UNIVERSITY GANDHINAGAR										
SCHOOL OF TECHNOLOGY										
CE201T Surveying										
Teaching Scheme					Examination Scheme					
L	T	P	C	Hrs/Week	Theory			Practical		Total marks
					MS	ES	IA	LW	LE/Viva	
3	-	-	6	3	30	60	10	-	-	100

**UNIT I** **09**

**Principles Surveying:** Classification of surveys; Linear measurements using chains and tapes, chaining and ranging, principles of chain survey, reciprocal ranging, applications, errors and corrections in chaining, obstacles in chaining, Electronic Distance Measurement (EDM).

**UNIT II** **08**

**Angle and direction measurements:** Measurement of bearing, Designation of bearings, whole circle bearings & quadrant bearings, fore bearing and back bearing, Computation of angles from bearings, Principles of compass survey, local attraction and corrections, compass traverse and adjustments ; **Plane table survey:** Equipments, working operations, different methods, advantages and disadvantages, Two point and Three point problems.

**UNIT III** **12**

**Elevation measurements: Principle of leveling, leveling instruments-** Dumpy and Automatic levels, booking and reducing levels, simple and differential leveling, profile and cross-section leveling, reciprocal leveling, methods of leveling, leveling difficulties, curvature and refraction corrections, examples, **Contouring:** definition, contour interval, characteristics of contours, direct and indirect methods of contouring, interpolation of contours, uses of contour maps.

**UNIT IV** **10**

**Theodolite Traversing:** Theodolite, temporary and permanent adjustments, measurement of horizontal and vertical angles, elimination of errors, Traversing: Uses and method of traversing, traversing procedure, check in closed and open traverse, traverse computation, plotting of traverse survey, numericals, Total station, functioning and measurements, field project using total station.

**Computation of Areas & Volumes:** Computation of area of regular & irregular boundary, Trapezoidal & Simpson's rule, computation of volume for earthwork in cutting & filling.

**APPROXIMATE TOTAL 39 Hours**

**References:**

1. Plain Surveying, AM Chandra, New Age International Publishers.
2. Surveying Vol-I, BC Punamia, AK Jain, Laxmi Publishing.
3. Surveying Vol-I and II, S.K.Duggal, Tata Macgraw Hill Publication, New Delhi.
4. Advanced Surveying- Agor.

PANDIT DEENDAYAL PETROLEUM UNIVERSITY GANDHINAGAR										
SCHOOL OF TECHNOLOGY										
<b>CE201P Surveying</b>										
Teaching Scheme					Examination Scheme					
L	T	P	C	Hrs/Week	Theory			Practical		Total marks
					MS	ES	IA	LW	LE/Viva	
-	-	<b>2</b>	<b>1</b>	<b>2</b>	-	-	-	<b>25</b>	<b>25</b>	<b>50</b>

### List of Experiments:

1. Measurement of offsets for a building
2. Tape and compass traverse survey for a boundary line
3. Simple leveling and measurement of gradients
4. Profile leveling and cross-section leveling for a road line
5. Preparation of a contour sheet for an area
6. Plane table surveying for a land area, traffic junction
7. Measurement of horizontal and vertical angles using theodolite
8. Field project using total station

PANDIT DEENDAYAL PETROLEUM UNIVERSITY GANDHINAGAR										
SCHOOL OF TECHNOLOGY										
CE202T Fluid Mechanics-I										
Teaching Scheme					Examination Scheme					
L	T	P	C	Hrs/Week	Theory			Practical		Total marks
					MS	ES	IA	LW	LE/Viva	
<b>3</b>	-	-	<b>6</b>	<b>3</b>	<b>30</b>	<b>60</b>	<b>10</b>	-	-	<b>100</b>

**UNIT I** **11**

Physical properties of fluids- Viscosity, Compressibility, Elasticity, Ideal and Real fluids, Concepts of shear stress, Newtonian and Non-Newtonian fluids. ; Pressure-density-height relationships, Pascal's law, Pressure on plane and curved surfaces, Buoyancy, measurement of pressure, manometers, Stability of immersed and floating bodies, oscilation of a floating body

**UNIT II** **08**

Free and forced vortex; steady and unsteady; uniform and non-uniform, laminar and turbulent flows, free surface flows and enclosed flows, definition of one, two and three dimensional flows, velocity and accelerations, stream lines, streak lines and path lines, stream tubes, stream function and velocity potential, flow nets, circulation and vorticity.

**UNIT III** **12**

Equation of continuity, one dimensional Euler's equation of motion and its integration to obtain Bernoulli's equation, momentum equation, hydraulic mean radius, concept of friction loss, Darcy-Weisbach equation minor losses in pipe, branched pipes in parallel and series, transmission of power, water hammer in pipes, laminar flow in pipes Hazen Poiseulli's equation, Turbulent flow in pipes, velocity distribution in pipes, Moody's diagram.

**UNIT IV** **08**

Boundary layer thickness, energy thickness, laminar and turbulent boundary layer, separation of boundary layer, momentum integral equation, drag and lift coefficient, pressure drag and friction characteristics of sphere, cylinder and disc, circulation, lift and magnus effect, lift characteristics of air foils, induced drag.

**APPROXIMATE TOTAL 39 Hours**

**References:**

1. Fluid Mechanics: Fundamentals and applications, YA Cengel, JM Cimbala, McGraw Hill Publication
2. Fluid Mechanics and hydraulic machines, RK Bansal, Laxmi Publishing.

PANDIT DEENDAYAL PETROLEUM UNIVERSITY GANDHINAGAR										
SCHOOL OF TECHNOLOGY										
CE202P Fluid Mechanics-I										
Teaching Scheme					Examination Scheme					
L	T	P	C	Hrs/Week	Theory			Practical		Total marks
					MS	ES	IA	LW	LE/Viva	
-	-	2	1	2	-	-	-	25	25	50

**List of Experiments:**

1. Determination of viscosity of oil
2. Establish relationship between pressure and height
3. Determination of metacentre of a floating body
4. Verification of conservation of energy in a duct based on Bernouli's theorem
5. Calibration of venturimeter, orificemeter, pitot tube and rotameter
6. Determination of coefficient of friction in close conduit as major losses
7. Determination of minor losses from bend, elbow, sudden contraction, enlargement

PANDIT DEENDAYAL PETROLEUM UNIVERSITY GANDHINAGAR										
SCHOOL OF TECHNOLOGY										
<b>CE203T Building Planning and Drawing</b>										
Teaching Scheme					Examination Scheme					
L	T	P	C	Hrs/Week	Theory			Practical		Total marks
					MS	ES	IA	LW	LE/Viva	
<b>1</b>	-	-	<b>2</b>	<b>1</b>	<b>30</b>	<b>60</b>	<b>10</b>	-	-	<b>100</b>

**UNIT I** **05**

Functional planning of buildings: Planning, designing and construction, General building requirements, Permit and Inspection (as per the National building Code)

**UNIT II** **08**

Practice and Techniques: Elements of City plan, Estimating future needs, Planning standards, Zoning, definition, regulations and procedures, building bye laws, height and bulk zoning, F.A.R., planning law and administration

**APPROXIMATE TOTAL 13 Hours**

**References:**

1. Building planning, design and scheduling, Gurcharan Singh, Standard Book House New Delhi
2. Building drawing, MG Shah, CM Kale, SY Patki, Tata McGraw Hill New Delhi
3. General Development Control Regulations, AUDA Ahmedabad

PANDIT DEENDAYAL PETROLEUM UNIVERSITY GANDHINAGAR										
SCHOOL OF TECHNOLOGY										
<b>CE203P Building and Drawing</b>										
Teaching Scheme					Examination Scheme					
L	T	P	C	Hrs/Week	Theory			Practical		Total marks
					MS	ES	IA	LW	LE/Viva	
-	-	<b>4</b>	<b>2</b>	<b>4</b>	-	-	-	<b>25</b>	<b>25</b>	<b>50</b>

**List of Experiments:**

1. Drawing reading
2. Detail drawing for door, windows, and rolling shutters
3. Detailed drawing (plan, elevation and section) for residential buildings, commercial and institutional buildings
4. Preparation of building plan in Auto-CAD



PANDIT DEENDAYAL PETROLEUM UNIVERSITY GANDHINAGAR										
SCHOOL OF TECHNOLOGY										
CE204T Building Construction and Materials										
Teaching Scheme					Examination Scheme					
L	T	P	C	Hrs/Week	Theory			Practical		Total marks
					MS	ES	IA	LW	LE/Viva	
3	-	-	6	3	30	60	10	-	-	100

**UNIT I** **09**

Components of a building and their functions, foundation, shallow and deep foundation, grillage, raft, inverted arches, causes of failure of foundations and remedial measures, Masonry: types- Bricks and stone masonry, functions, material requirements, different bonds, damp proofing course

**UNIT II** **09**

Shoring, under pinning, scaffolding, horizontal and vertical shores, purpose and methods of under pinning, different types of scaffolding, floors and roofs: types, details of construction and materials

**UNIT III** **09**

Doors: paneled, glazed, flushed doors, collapsible steel doors, Windows: Casement, Sash, and Skylight windows, Staircase: Requirement of a good staircase, different types of stair cases

**UNIT IV** **12**

Physical and chemical characteristic of commonly used building materials in Civil Engineering construction – Clay, Sand, Stone, Lime, Cement, Concrete, Bricks, Silica, Aluminum and Timber with reference to its specifications. Plywood, asbestos, plastics and polymer based materials. Green building materials & technology.

**APPROXIMATE TOTAL 39 Hours**

**References:**

1. Sushil Kumar, Building Construction, Standard Publishers, Delhi.
2. Surendra Singh, Engineering Materials, Konark Publishers Pvt. Ltd.
3. D.S.Arora, 'Text Book of Engineering Materials', Kalyani Publishers
4. B.C. Punmia, 'Building Construction' Laxmi Publications Pvt. Ltd.

PANDIT DEENDAYAL PETROLEUM UNIVERSITY GANDHINAGAR										
SCHOOL OF TECHNOLOGY										
CE 205T Structural Analysis-I										
Teaching Scheme					Examination Scheme					
L	T	P	C	Hrs/Week	Theory			Practical		Total marks
					MS	ES	IA	LW	LE/Viva	
3	1	-	7	4	30	60	10	-	-	100

**UNIT I** **09**

Principal stresses and principal strains, Mohr's circle, Hoop Stresses, examples of civil engineering structures subjected to hoop stresses, theory of simple bending, position of neutral axes, practical application of bending equation, shear stress in beam, shear stress distribution for typical section, combined direct & bending stresses.

**UNIT II** **09**

Bending Moment & Shear Force: Relationship between bending moment, shear force load, S.F. and B.M. diagrams for simply supported, overhanging and cantilever beams using numerical methods. Introduction of the use of Bending Moments & Shear Force Diagrams in civil engineering structures, Bending & Shear Stresses: Theory of simple bending, moment of inertia, section modulus and theorem of parallel axes, Distribution of bending and shear stresses across the section.

**UNIT III**

**Columns & Struts:** Euler's theory of buckling for different end conditions, Effective length, Initial imperfection and residual stresses, slenderness ratio, end connections, short columns, eccentrically loaded short columns, cylinder columns subjected to axial and eccentric loading. **Deflections:** Introduction, slope and deflections in beams by differential equations, moment area method and conjugate beam method, principle of virtual work, Maxwell's Law of Reciprocal Deflections. **10**

**UNIT IV**

Three Hinged Arch: Horizontal thrust, shear force and bending moment diagrams. Influence lines and Rolling loads: Introduction, influence lines for simple beam reactions, Influence lines for simple beam shears, Influence lines for simple beam moments, rolling loads, maximum shear and bending moment at a section in a beam supporting U.D.L., two concentrated loads, series of moving concentrated loads, maximum S.F. & B.M. diagrams. **11**

**APPROXIMATE TOTAL 39 Hours**

**References:**

1. Timoshenko and young, 'Strength of Materials', Von Nostrand East West Press.
2. E.P. Popov 'Mechanics of Materials' Prentice Hall India.
3. B.C. Punmia 'Strength of Materials & Mechanics of Structures', Vol. 1, Standard Book House.
4. S.Ramamrutham, Strength of Materials & Mechanics of Structures, Vol-I, Standard Book House.
5. S.B.Junnarkar & H.J.Shah, Mechanics of Structures, Vol-II, Charotar Publishing House, Anand, 2007.

PANDIT DEENDAYAL PETROLEUM UNIVERSITY GANDHINAGAR										
SCHOOL OF TECHNOLOGY										
CE 206T Engineering Geology										
Teaching Scheme					Examination Scheme					
L	T	P	C	Hrs/Week	Theory			Practical		Total marks
					MS	ES	IA	LW	LE/Viva	
<b>2</b>	-	-	<b>4</b>	<b>2</b>	<b>30</b>	<b>60</b>	<b>10</b>	-	-	<b>100</b>

**UNIT I** **06**

Definition and scope of geology, branches of geology, origin, age and interior of earth movements and importance in engineering, plate tectonics, earthquake belts in India, Geological agencies/ earth processes: weathering, erosion by running waters, glaciers, wind and ocean-their engineering importance

**UNIT II** **06**

Mineralogy: study of the rock forming minerals, properties , behaviour and engineering significance of clay minerals

**UNIT III** **06**

Petrology: classification of rocks, description, occurrence, engineering properties and distribution various types of rocks/construction materials

**UNIT IV** **06**

Structural geology: Dip, strike, folds, faults and joints-their engineering aspects, geological maps and geotechnical investigations for dam, tunnels, buildings, road cuttings, landslides-causes and prevention, sea erosion and coastal protection

**APPROXIMATE TOTAL 24 Hours**

**References:**

1. Textbook Of Engineering Geology by Kesavulu (2009)Macmillan India Limited, 2nd Ed, 472 pages
2. Principals of Engineering Geology by K M Bangar (2009): Standard Publishers Distributors, 2ndEdition, 451 pages
3. Engineering Geology by D V Reddy (2010):Vikas Publishing House, 1st Edition
4. Foundations of Engineering Geology by Waltham Tony, Tony Waltham (2009): Spons Architecture Price Book, 3rd Edition, 104 pages

PANDIT DEENDAYAL PETROLEUM UNIVERSITY GANDHINAGAR										
SCHOOL OF TECHNOLOGY										
CE 206P Engineering Geology										
Teaching Scheme					Examination Scheme					
L	T	P	C	Hrs/Week	Theory			Practical		Total marks
					MS	ES	IA	LW	LE/Viva	
-	-	2	1	2	-	-	-	25	25	50

**List of experiments:**

1. Mineral identification by physical properties
2. Igneous rocks
3. Review the process of weathering, sedimentation, and diagenesis
4. Understand fold and faults within a rock mass
5. Study geological features of rocks such as strike and dip
6. Soil erosion and physical weathering in the rocks
7. Structural analysis using stereonet or Wulff's net
8. Geological maps representing the geological structure of some segment
9. Use of GPS instrument for geological data generation
10. Project work