

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

Semester V			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.	CE301T	Transportation Engineering - I	3	-	-	6	3	30	60	10	-	-	100
	CE301P		-	-	2	1	2	-	-	-	25	25	50
2.	CE302T	Hydrology and Water Resources	3	1	-	7	4	30	60	10	-	-	100
3.	CE303T	Environmental Engineering - II	3	-	-	6	3	30	60	10	-	-	100
	CE303P		-	-	2	1	2	-	-	-	25	25	50
4.	CE304T	Geotechnical Engineering - I	3	-	-	6	3	30	60	10	-	-	100
	CE304P		-	-	2	1	2	-	-	-	25	25	50
5.	CE305T	Design of RCC Structures	3	1	-	7	4	30	60	10	-	-	100
6.	CE306T	Urban and Rural Planning	2	-	-	4	2	30	60	10	-	-	100
	CE306P		-	-	2	1	2	-	-	-	25	25	50
7.	CE 308P	Industrial Orientation	-	-	-	3	-	-	-	-	50	50	100
		TOTAL	17	2	8	40	27	-	-	-	-	-	900

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

PANDIT DEENDAYAL PETROLEUM UNIVERSITY GANDHINAGAR										
SCHOOL OF TECHNOLOGY										
CE301T Transportation Engineering-I										
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 **06**

PRINCIPLES OF TRANSPORTATION ENGINEERING: Importance of transportation, Different modes of transportation and comparison, Characteristics of road transport, Road types and classification, road patterns, planning surveys, Indian Roads Congress Guidelines

10

UNIT II

HIGHWAY GEOMETRIC DESIGN: Ideal Alignment, Factors affecting the alignment, Terrain classification, Design speed, Factors affecting geometric design, Cross sectional elements- Camber- width of pavement- Shoulders-, Width of formation- Right of way, Typical cross sections; Sight Distance-Restrictions to sight distance- Stopping sight distance- Overtaking sight distance- overtaking zones- Examples on SSD and OSD- Sight distance at intersections, Horizontal alignment-Radius of Curve- Super elevation – Extra widening- Transition curve and its length, setback distance – Examples, Vertical alignment-Gradient-summit and valley curves

10

UNIT III

PAVEMENT MATERIALS: Sub grade soil – desirable properties-HRB soil classification-determination of CBR and modulus of sub grade reaction-Examples, Aggregates- Desirable properties and list of tests, Explanation on Tar, bitumen, cutback and emulsion-List of tests on bituminous materials; PAVEMENT DESIGN: Pavement types, component parts of flexible and rigid pavements and their functions, design factors, ESWL and its determination, Flexible pavement- Design of flexible pavements as per IRC:37-2001-, Rigid pavement- Westergaard's equations for load and temperature stresses- Design of slab thickness only as per IRC:58-2002

12

UNIT IV

PAVEMENT CONSTRUCTION: Earthwork –cutting-Filling, Preparation of sub grade, Specification and construction of i) Granular Sub base, ii) WBM Base, iii) WMM base, iv) Bituminous Macadam, v) Dense Bituminous Macadam vi) Bituminous Concrete, vii) Dry Lean Concrete sub base and PQC viii) concrete roads; HIGHWAY DRAINAGE: Significance and requirements, Surface drainage system and design-Examples, sub surface drainage system, design of filter materials; HIGHWAY ECONOMICS: Highway user benefits, VOC using charts only-Examples, Economic analysis – annual cost method-Benefit Cost Ratio method-NPV-IRR methods- Examples, Highway financing-BOT-BOOT concepts.

Approximate Total 38 Hours

References:

1. Highway Engineering – S K Khanna and C E G Justo, Nem Chand Bros, Roorkee
2. Highway Engineering - L R Kadiyali, Khanna Publishers, New Delhi
3. Transportation Engineering – K P Subramaniam, Scitech Publications, Chenna
4. Transportation Engineering – James H Banks, Mc. Graw. Hill Pub. New Delhi
5. Highway Engineering –R. Sreenivasa Kumar, University Press. Pvt.Ltd. Hyderabad

PANDIT DEENDAYAL PETROLEUM UNIVERSITY GANDHINAGAR										
SCHOOL OF TECHNOLOGY										
CE301P Transportation Engineering-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. To determine the elongation and flakiness index for an aggregate sample
2. To determine the Crushing value for an aggregate sample
3. To determine the Impact value for an aggregate sample
4. To determine the Abrasion value for an aggregate sample
5. To determine the water absorption of given coarse aggregates
6. To determine the ductility of a given sample of bitumen
7. To determine of suitability of bitumen for its use in road construction
8. To determine viscosity & specific gravity of given bituminous material
9. To determine consistency of bituminous material
10. To determine softening point, flash point, fire point of bituminous material

PANDIT DEENDAYAL PETROLEUM UNIVERSITY GANDHINAGAR										
SCHOOL OF TECHNOLOGY										
CE302T Hydrology and Water Resources										
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 **10**

Hydrological cycle, rainfall, rainfall measurement, computation of mean rainfall, methods, infiltration, factors affecting infiltration, evaporation, runoff measurement, methods for runoff analysis, unit hydrograph, S-hydrograph

10

UNIT II

Groundwater, types of aquifers, confined and unconfined, storage coefficient, steady radial flow into a well, well hydraulics, Darcy's equations, penetrating artesian wells, tube wells, open wells, advantages and disadvantages

UNIT III

River engineering, classification of rivers, rivers in alluvium plain, river meandering, methods of estimation of river meandering, river training works

08

UNIT IV

Reservoir planning, investigation, zones of storage, single and multi-purpose reservoirs, determination of storage capacity, yield, reservoir sedimentation, reservoir life estimation, sediment prevention. Flood management: flood estimation, flood forecasting, flood routing. Rain water harvesting: types & methodology.

10

Approximate Total 38 Hours

References:

1. Hydrology and water resources engineering by S.K.Garg
2. Introduction to hydrology, W Viessman, GL Lewis, Pearson Education
3. Hydrology-Principle, analysis and design, HM Raghunath, New Age Publishers
4. Irrigation and water power engineering, BC Punamia, Pandey BB Lal, Standard Publishers

PANDIT DEENDAYAL PETROLEUM UNIVERSITY GANDHINAGAR										
SCHOOL OF TECHNOLOGY										
CE303T Environmental Engineering - II										
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 **08**

Waste water treatment, sewage and effluent, sources of wastewater, classification of wastewater, pollutions, characteristics and testing of sewage, composition, sampling, physical and chemical analysis

08

UNIT II

Design of sewer systems: Domestic waste treatment, quantity of sewage, single and combined systems, design of sewer systems, provision for expansion, Testing of sewer line, cleaning of sewers, standards

UNIT III

Industrial waste treatment: objectives, significance of treatment, classification of treatment processes, wastewater treatment, operations, screenings, skimming, sedimentation, biological treatment, aerobic and anaerobic treatment, trickling filters and design, LRTF & HRTF, types and modifications, activated sludge process, modes of waste water disposal membranes

12

UNIT IV

Sewage treatment, principles, ETP design, Energy recovery from waste, sludge digesters and bio gas plants

10

Total Approximate 38 Hours

References:

1. Water and wastewater engineering, Metcalf and Eddy, McGraw Hill
2. Environmental engineering, HS Paevy, DR Rowe, G Tchobanoglous, McGraw Hill
3. Environmental engineering: Wastewater engineering, SK Garg, Khanna Publishers
4. Water supply and sanitation engineering, GS Birdie, JS Birdie, Galgotia Publishing Ltd.

PANDIT DEENDAYAL PETROLEUM UNIVERSITY GANDHINAGAR										
SCHOOL OF TECHNOLOGY										
CE303P Environmental Engineering - II										
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 DO in waste water.
2. Determination of BOD and COD in waste water.
3. Determination of Sulphate content in sewage.
4. Determination of total solids (Suspended, Dissolved, Volatile and Non-volatile)
5. Analysis of water quality, quantity parameters in a wastewater
6. Presumptive test for coliform bacteria.
7. Determination of Coagulant dose by Jar test.
8. Designing a filtration system
9. Designing a waste water distribution system

PANDIT DEENDAYAL PETROLEUM UNIVERSITY GANDHINAGAR										
SCHOOL OF TECHNOLOGY										
CE304T Geotechnical Engineering - I										
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 **06**

Fundamental definitions, origin and formation of soil. Phase Diagram, Voids ratio, Porosity, Percentage Air Voids, Air content, Degree of saturation, Water content, Specific Gravity of soil solids and soil mass, Densities and Unit weights - Bulk, Dry, Saturated & submerged and their inter relationships

UNIT II **09**

Index Properties of soil- Water content , Specific Gravity, Particle size distribution, Relative Density, Consistency limits and indices, in-situ density, Activity of Clay, Laboratory methods of determination of index properties of soils.

UNIT III **12**

Permeability, Darcy's law- assumption and validity, coefficient of permeability and its determination, factors affecting permeability, permeability of stratified soils, Seepage velocity, Superficial velocity and coefficient of percolation, quick sand phenomena, Capillary Phenomena,

Concept of shear strength, Mohr-coulomb theory, conventional and modified failure envelopes, Effective stress concept total stress, effective stress and Neutral stress, Concept of pore pressure, Total and effective shear strength parameters, factors affecting shear strength of soils

UNIT IV **12**

Compaction, Standard and Modified proctor's compaction tests, factors affecting compaction, effect of compaction on soil properties, Field compaction control – compactive effort & method, lift thickness and number of passes, Proctor's needle, Compaction equipment

Consolidation: Definition, Terzaghi's one dimensional consolidation theory-assumption and limitations, Normally consolidated, under consolidated and over consolidated soils, pre-consolidation pressure and its determination, Consolidation characteristics of soil

Approximate Total 39 Hours

References:

1. Soil Mechanics and Foundation Engg. Punmia B.C. (2005), 16th Edition Laxmi Publications Co., New Delhi.
2. Principles of Soil Mechanics and Foundation Engineering- Murthy V.N.S. (1996), 4th Edition, UBS Publishers and Distributors, New Delhi.
3. Geotechnical Engineering; Braja, M. Das (2002), Fifth Edition, Thomson Business Information India (P) Ltd., India
4. Foundation Analysis and Design- Bowles J.E. (1996), 5th Edition, McGraw Hill Pub. Co. New York.
5. Soil Engineering in Theory and Practice- Alam Singh and Chowdhary G.R. (1994), CBS Publishers and Distributors Ltd., New Delhi.
6. Basic and Applied Soil Mechanics- Gopal Ranjan and Rao A.S.R. (2000), New Age

International (P) Ltd., Newe Delhi.

7. Geotechnical Engineering- Donold P Coduto Phi Learning Private Limited, New Delhi
8. Geotechnical Engineering- Shashi K. Gulathi & Manoj Datta. (2009), Tata Mc Graw Hill.
9. Text Book of Geotechnical Engineering- Iqbal H. Khan (2005), 2nd Edition, PHI, India.
10. Numerical Problems, Examples and objective questions in Geotechnical Engineering- Narasimha Rao A. V. & Venkatrahmaiah C. (2000), Universities Press., Hyderabad.

PANDIT DEENDAYAL PETROLEUM UNIVERSITY GANDHINAGAR										
SCHOOL OF TECHNOLOGY										
CE304P Geotechnical Engineering - 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 moisture content
2. Determination of specific gravity
3. Field density test
4. Determination of Relative Density
5. Determination of particle size(sieve analysis, hydrometer test)
6. Determination of consistency limits and indices
7. Standard proctor compaction test
8. Permeability test
9. Unconfined Compression Test
10. Vane Shear Test

PANDIT DEENDAYAL PETROLEUM UNIVERSITY GANDHINAGAR										
SCHOOL OF TECHNOLOGY										
CE305T Design of RCC Structures										
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 **08**

Design: strength, stiffness, stability, serviceability, Design process: Analysis, design and detailing, Design philosophy: working stress method, Ultimate load method, Limit state method, plastic method

UNIT II **11**

Flexural design: Analysis, design and detailing of rectangular & flanged beams, one-way & two way simply supported & continuous slabs, Flexural and shear design: Design and detailing of rectangular & flanged beams; Axial load design: Design and detailing of axially loaded Short columns Combined axial, shear and flexural design: Design and detailing of uniaxial & biaxial - Short & long columns; Torsion design: Design of rectangular beam section for torsion

UNIT III **11**

Combined shear and torsion: Design of rectangular beam section, Shear, flexural, punching, torsion: Design of isolated footing and combined footing, Bond and development length: Checking bond & development length for bars under tension, compression, Combined axial, shear, flexure: Design and detailing of uniaxial & biaxial – Short & long columns. Design of flat slabs

UNIT IV **09**

Axial force design: Tension member, compression member, Flexural design for beams: Restrained, unrestrained Combined axial and flexural design: Columns, Footing : slab based, gusseted base foundation, Torsion design and connections, Beams, columns, Combined axial, flexural and torsion: columns, Connections: Bolted – bearing type, Hsfg for seismic purpose, Welded: types of electrodes, Connection design for tension, compression, flexural, flexural + shear

Approximate Total 39 Hours

IS CODES:

- Code of practice for plain and reinforced concrete IS : 456 (III revision) (with amendment I)
- Code of practice for structural safety of Buildings IS : 875 Part I to V Loading standards.(revised)(with Amendment 1)

References:

- Shah and Karve; Limit State theory & Design of Reinforced Concrete
- A.K.Jain; Design of Concrete Structures, Nemchand Publication

PANDIT DEENDAYAL PETROLEUM UNIVERSITY GANDHINAGAR										
SCHOOL OF TECHNOLOGY										
CE 306T Urban and Rural Planning										
Teaching Scheme					Examination Scheme					
L	T	P	C	Hrs/Week	Theory			Practical		Total marks
					MS	ES	IA	LW	LE/Viva	
2	-	-	4	2	30	60	10	-	-	100

UNIT I **06**

Town Planning ; Evolution of towns, rural and urban pattern of growth, factors promoting growth and development of rural-urban areas, History and trends in town planning, origin and growth, Historical development of town planning in ancient valley civilizations; Objects and necessary of town planning; Surveys and analysis of a town

UNIT II

New Concepts in town planning : Garden city movement, Linear city and Satellite city concepts, Neighborhood Planning ; Planning Principles **06**

UNIT III

Master Plan; Concepts of urban planning in India, case studies new town Gandhinagar, Jaipur, Chandigarh, design and landscaping for urban and rural areas, rural planning, concept of regional plans, physical planning of villages, standards and infrastructure requirements and planning **06**

UNIT IV

Laws and practices on 73rd and 74th constitutional amendment act **04**

Approximate Total 22 Hours

References:

1. GK Hiraskar, Town Planning in India, Dhanpat Rai and Sons New Delhi
2. N K Gandhi, Town Planning in India

PANDIT DEENDAYAL PETROLEUM UNIVERSITY GANDHINAGAR										
SCHOOL OF TECHNOLOGY										
CE 306P Urban and Rural Planning										
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. Studio on development of a city plan
2. Studio on development of village plans, regional plans
3. Conducting survey on city infrastructure, socio-economic and development