

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

Semester VI			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.	CE311T	Transportation Engineering -II	3	-	-	6	3	30	60	10	-	-	100
	CE311P		-	-	2	1	2	-	-	-	25	25	50
2.	CE312T	Irrigation Engineering	3	1	-	7	4	30	60	10	-	-	100
3.	CE313T	Computer Aided Design	1	-	-	2	1	30	60	10	-	-	100
	CE313P		-	-	4	2	4	-	-	-	25	25	50
4.	CE314T	Geotechnical Engineering - II	3	-	-	6	3	30	60	10	-	-	100
	CE314P		-	-	2	1	2	-	-	-	25	25	50
5.	CE315T	Design of Steel Structures	3	1	-	7	4	30	60	10	-	-	100
6.	CE31XT	HM- Elective*	2	-	-	4	2	30	60	10	-	-	100
		TOTAL	15	2	8	36	25	-	-	-	-	-	750

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

HM-Elective*

HS311 Social science approaches to development

HS313 Environment Development and Society

HS314 Organizational psychology

PANDIT DEENDAYAL PETROLEUM UNIVERSITY GANDHINAGAR										
SCHOOL OF TECHNOLOGY										
CE311T Transportation 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

RAILWAY ENGINEERING

09

INTRODUCTION: Role of railways in transportation, Indian Railways, Selection of Routes, Permanent way and its requirements, Gauges and types, Typical cross sections-single and double line B G track in cutting, embankment and electrified tracks, Coning of wheels and tilting of rails, Rails-Functions-requirements—types and sections length- defects-wear-creep-welding-joints, creep of rails

SLEEPERS AND BALLAST: Functions, requirements, Types, Track fitting and fasteners-Dog spike, screw spike and Pandrol clip,-Fish plates-bearing plates, Calculation of quantity of materials required for laying a track-Examples, Tractate resistances and hauling capacity

UNIT II

10

GEOMETRIC DESIGN: Necessity, Safe speed on curves, Cant-cant deficiency-negative cant-safe speed based on various criteria,(both for normal and high speed tracks) Transition curve, Gradient and types, grade compensation, Examples on above.

POINTS AND CROSSING: Components of a turnout, Details of Points and Crossing, Design of turnouts with examples (No derivations) types of switches, crossings, track junctions Stations and Types, Types of yards, Signalling-Objects and types of signals, station and yard Equipment-Turn table, Fouling mark, buffer stop, level crossing, track defects, and maintenance.

Hrs

UNIT III

10

AIRPORT ENGINEERING INTRODUCTION: Layout of an airport with component parts and functions, Site selection for airport, Aircraft characteristics affecting the design and planning of airport, Airport classification, Runway orientation using wind rose with examples.

RUNWAY- Basic runway length-Corrections and examples, Runway geometrics, Taxiway-Factors affecting the layout - geometrics of taxiway-Design of exit taxiway with examples, Visual aids-Airport marking – lighting-Instrumental Landing System.

10

UNIT IV

DOCKS AND HARBOURS: Harbour classifications, Layout with components Natural phenomenon affecting the design of harbours - wind, wave and tide, currents, Breakwater-Types Wharf and Quays, Jetties and Piers, Dry dock and wet docks, Slipways, Navigational aids, warehouse and transit-shed.

Approximate Total 39 Hours

References:

1. Saxena and Arora, Railway Engineering - Dhanpat Rai & Sons, New Delhi
2. M M Agarwal, Indian Railway Track Jaico Publications, Bombay
3. Khanna Arora and Jain Airport Planning and Design , Nem Chand Bros, Roorkee
4. R Srinivasan, Docks and Tunnel Engineering Charaotar Publishing House
5. H P Oza and G H Oza Docks and Harbour Engineering Charaotar Publishing House
6. B C Punmia, Surveying Laxmi Publications
7. Mundrey, Railway Engineering McGraw Hill Publications

PANDIT DEENDAYAL PETROLEUM UNIVERSITY GANDHINAGAR										
SCHOOL OF TECHNOLOGY										
CE311P Transportation 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 quantity of bitumen in hot-mix paving mixtures and pavement samples
2. Determination of optimum binder content of given bituminous mix by Marshall method of mix design.
3. Drawing typical sketches of various cross-section of a B.G.Track(in embankment, single and double line, in cutting etc.)
4. Drawing typical sketches of coning of wheel, behavior of coning curves
5. Drawing typical sketches on various rail sections, failures in rails, wears in rails etc.
6. Drawing typical sketches on various types of sleepers, various track fittings and fastenings
7. Drawing typical sketches of various turnouts, points and crossings
8. Drawing typical layout plan of Airport showing various components of Airports
9. Drawing typical layout plan of ports and harbors showing various components

PANDIT DEENDAYAL PETROLEUM UNIVERSITY GANDHINAGAR										
SCHOOL OF TECHNOLOGY										
CE312T Irrigation Engineering										
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**

Necessity of Irrigation in India, Advantages and disadvantages, techniques of irrigation water, Quality of irrigation water, Crop water requirements, crops and crop season, Consumptive use, Irrigation requirements, Estimation of consumptive use of water by climatic approaches, Irrigation efficiencies, Soil moisture-irrigation relationship

08

UNIT II

Canal Irrigation: Classification of canals, Canal losses, alignment of canals, Design of Irrigation Canals: Design of stable channels using Kennedy's and Lacey's theory, Garret's diagram, Cross section of irrigation canals, Lining of Irrigation Canals: Advantages and economics of lining, Various types of lining, Design of lined canals

UNIT III

Types of Cross-Drainage Works: Types of CD works, Selection of a suitable type to suite a particular condition, Design consideration for CD works, Canal Falls: Necessity, Proper location, Types, Design and detailing of one type of fall; Weirs and Barrages: Weirs and Barrages, Types of weirs and barrages, Layout of a diversion head work, Introduction of different components of a diversion head works, Design of weirs and barrages: Bligh's creep theory, Design of weir using Bligh's theory, Lane's weighted creep theory, Khosla's theory, Khosla's method of independent variables, Exit gradient

11

UNIT IV

Dams: Typical cross section, Various forces acting on gravity dam, Combination of forces for design, modes of failure and criteria for structural stability, High and low gravity dam, Design of high dam, Typical section of low gravity dam, Earth and Rock fill Dams: Types, Causes of failure, Preliminary section of an earth dam, Preliminary section of an earth dam, Seepage control in earth dams, Spillways: Descriptive study of various types of spillways

12

Reclamation of Water Logged and Saline Soils: Causes and control of water logging. Reclamation of saline and alkaline land, Surface and Sub-surface drainage

Approximate Total 39 Hours

References:

1. Irrigation engineering and hydraulic structures, SK Garg, Khanna Publishers
2. Irrigation and water power engineering, BC Punamia, Pandey BB Lal, Standard Publishers
3. Principles and practice of irrigation engineering, SK Sharma, S Chand and Company

PANDIT DEENDAYAL PETROLEUM UNIVERSITY GANDHINAGAR										
SCHOOL OF TECHNOLOGY										
CE 313T Computer Aided Design										
Teaching Scheme					Examination Scheme					Total marks
L	T	P	C	Hrs/Week	Theory			Practical		
					MS	ES	IA	LW	LE/Viva	
1	-	-	7	4	30	60	10	-	-	100

UNIT I

Design & drafting of residential buildings 4

UNIT II

Design & drafting of commercial buildings 3

UNIT III

Application of CAD in water supply and storm water disposal project 3

UNIT IV

Potential role and applications of GIS softwares in CAD 3

Approximate Total 13 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 313P Computer Aided Design										
Teaching Scheme					Examination Scheme					
L	T	P	C	Hrs/Week	Theory			Practical		Total marks
					MS	ES	IA	LW	LE/Viva	
--	--	4	2	4	--	--	--	25	25	50

List of Experiments:

1. Exposure of the different commands in CAD
2. Design & drafting of residential buildings
3. Design & drafting of commercial buildings
4. Design of RCC structures
5. Design of pavements (flexible & rigid)
6. Design of water supply and storm water
7. Applications of structural design softwares
8. Applications of GIS softwares

PANDIT DEENDAYAL PETROLEUM UNIVERSITY GANDHINAGAR										
SCHOOL OF TECHNOLOGY										
CE314T Geotechnical 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

09

SUBSURFACE EXPLORATION: Importance of exploration program, Methods of exploration: Boring, Seismic refraction method of geophysical exploration, Types of samples - undisturbed, disturbed and representative samples, Samplers, sample disturbance, area ratio, Recovery ratio, clearance, Stabilization of boreholes - Typical bore log. Number and depth of borings for various civil engineering structures, soil exploration report.

DRAINAGE AND DEWATERING: Determination of ground water level by Hvorslev's method, Control of ground water during excavation: Dewatering - Ditches and sumps, well point system, Vacuum method, Electro- Osmosis method.

UNIT II

10

STRESSES IN SOILS: Boussinesq's and Westergaard's theories for concentrated, circular and rectangular loads. Comparison of Boussinesq's and Westergaard's analysis. Pressure distribution diagrams, Contact pressure, Newmark's chart.

FLOWNETS: Laplace equation (no derivation) assumptions and limitations only, characteristics and uses of flownets, Methods of drawing flownets for Dams and sheet piles. Estimating quantity of seepage and Exit gradient. Determination of phreatic line in earth dams with and without filter. Piping and protective filter.

LATERAL EARTH PRESSURE: Active and Passive earth pressures, Earth pressure at rest. Rankine's and Coulomb's Earth pressure theories—assumptions and limitations, Graphical solutions for active earth pressure (cohesionless soil only) – Culmann's and Rebhann's methods, Lateral earth pressure in cohesive and cohesionless soils, Earth pressure distribution.

UNIT III

10

STABILITY OF EARTH SLOPES: Types of slopes, causes and type of failure of slopes. Definition of factor of safety, Stability of infinite slopes, Stability of finite slopes by Method of slices and Friction Circle method, Taylor's stability number, Fellenius method.

BEARING CAPACITY: Definitions of ultimate, net and safe bearing capacities, Allowable bearing pressure. Terzaghi's and Brinch Hansen's bearing capacity equations - assumptions and limitations, Bearing capacity of footing subjected to eccentric loading. Effect of ground water table on bearing capacity. Field methods of evaluation of bearing capacity - Plate load test, Standard penetration test and cone penetration test.

UNIT IV

10

FOUNDATION SETTLEMENT: Importance and Concept of Settlement Analysis, Immediate, Consolidation and Secondary settlements (no derivations, but, computation using relevant formula for Normally Consolidated soils), Tolerance. BIS specifications for total and differential settlements of footings and rafts.

PROPORTIONING SHALLOW AND PILE FOUNDATIONS Allowable Bearing Pressure, Factors influencing the selection of depth of foundation, Factors influencing Allowable Bearing Pressure, Factors influencing the choice of foundation, Proportioning isolated, combined, strip and mat foundations, Classification of pile foundation, Pile load capacity, Proportioning pile foundation.

Total Approximate 39 Hours

References:

1. Alam Singh and Chowdhary G.R. (1994), Soil Engineering in Theory and Practice, CBS Publishers and Distributors Ltd., New Delhi
2. S Punmia B.C. (2005), soil Mechanics and Foundation Engg. 16th Edition Laxmi Publications Co. New Delhi.
3. Bowles J.E. (1996), Foundation Analysis and Design 5th Edition, McGraw Hill Pub. Co. New York
4. Murthy V.N.S. (1996), Soil Mechanics and Foundation Engineering- 4th Edition, UBS Publishers and Distributors, New Delhi.
5. Gopal Ranjan and Rao A.S.R. (2000), Basic and Applied Soil Mechanics New Age International (P) Ltd., New Delhi.
6. Venkatrahmaiah C. (2006), Geotechnical Engineering 3rd Edition New Age International (P) Ltd., New Delhi.
7. Craig R.F. (1987), Soil Mechanics Van Nostrand Reinhold Co. Ltd.
8. Braja M. Das (2002) Principles of Geotechnical Engineering, 5th Edition, Thomson Business Information India (P) Ltd., India.
9. Iqbal H. Khan (2005), Text Book of Geotechnical Engineering 2nd Edition, PHI, India.

PANDIT DEENDAYAL PETROLEUM UNIVERSITY GANDHINAGAR										
SCHOOL OF TECHNOLOGY										
CE314P Geotechnical 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 Free Swell Index and Swelling Pressure
2. California Bearing Ratio Test
3. Consolidation Test
4. Unconfined compression Test
5. Vane Shear Test
6. Direct Shear Test
7. Triaxial Shear Test
8. Standard Penetration Test

PANDIT DEENDAYAL PETROLEUM UNIVERSITY GANDHINAGAR										
SCHOOL OF TECHNOLOGY										
CE315T Design of Steel Structures										
Teaching Scheme					Examination Scheme					Total marks
L	T	P	C	Hrs/Week	Theory			Practical		
					MS	ES	IA	LW	LE/Viva	
3	1	-	7	4	30	60	10	-	-	100

UNIT I **09**

Design of connections in steel structures: Riveted, and bolted and welded connections, assumptions, Different types of joints, design of various types of riveted and welded connections subjected to direct loads and moments; Design of tension members: Selection of section, I.S. specifications, design of axially loaded tension members, design of members for axial tension and bending, end connections, design of lug angles and tension splices

UNIT II **10**

Design of compression members: Theory of buckling, design of column, cross section (single and built up sections), design of angle struts, eccentrically loaded columns, column splices, lacings and battens; Design of beams: Laterally stability, design of single and built up beams, plated beams and curtailment of flange plates

UNIT III **10**

Design of column bases and column footings: Slab base, gusseted base, and column bases subjected to moment. Independent column footing, combined column Footing; Design of roof trusses: Types of trusses, roofs and side coverage, types of loadings and load combinations, design of members and connections

UNIT IV **10**

Water tanks: Design of rectangular pressed steel tanks, cylindrical tanks with hemispherical bottom, design of staging; Plastic design of steel structures: Review of plastic analysis as covered in earlier courses, Effect of normal and shear forces on plastic moments, lateral buckling and local buckling of beam. Design of beams and frames, design of connections-straight corner, beam column and plate connections

Approximate Total 39 Hours

References:

1. K. S. Sai Ram; Design of Steel Structures, Pearson
2. Arya & Ajmani; Design of Steel Structures
3. Dayaratnam ; Design of Steel Structures
4. B.C.Punamia; Steel Structures, Laxmi Publication

PANDIT DEENDAYAL PETROLEUM UNIVERSITY GANDHINAGAR										
SCHOOL OF TECHNOLOGY										
HS 311T SOCIAL SCIENCE APPROACHES TO DEVELOPMENT										
Teaching Scheme					Teaching Scheme					Total Marks
L	T	P	C	Hrs/Week	Theory			Practical		
					MS	ES	IA	LW	LE/Viva	
2	-	-	4	2	30	60	10	--	--	100

Unit I **06**

Development and Underdevelopment – Historical genesis, theories, social indicators and measures. Issues of Human Development, MDGs, Poverty and Inequality

Unit II **06**

Indian Experiences with Development – India’s path of planning and mixed economy, Post Independence development experiences, Measures of Achievement of Indian Development, Phase of Economic reforms and liberalization.

Unit III **07**

Structures and Frameworks of Development in India – Social Structures and Indian Development Processes of Decentralization, Institutions of Local Governance and impact on Development; Government-Market-Civil Society Interface

Unit IV **07**

Interrogation of the accepted paradigm of development – Gender, Religion, Caste, Environment; Appropriate Technology and Development

Approximate Total 26 Hours

References:

1. Chakravarty.Sukhomoy: Development Planning : The Indian Experience, Clarendon press, Oxford
2. Kumar, D. And Bhattacharya, S.,Cambridge Economic History of India: Vol. 2, 1757-2003.Hyderabad: Orient Longman.
3. Mathur, B. L., (2002): Economic Planning and Development, Sublime Publications, New Delhi
4. Mkandawire, Thandika: Social Policy in a Development Context, UNRISD and Palgrave, New York,
5. Prabhu, K. Seetha: Economic Reforms and Social Sector Development: A study of Two Indian States, Sage, New Delhi
6. Rajneesh, S., S L Goel,: Panchayati Raj in India: Theory and Practice, Deep and Deep, New Delhi
7. Sachs, J.D., Varshney, A., and Bajpai, N, India in the era of economic reforms. New Delhi: Oxford University Press
8. Second Administrative Reforms Commission, Local Governance: An Inspiring Journey into Future, Sixth Report, GoI, New Delhi
9. Sen, Amartya, Reprinted, Inequality Reexamined, Oxford, New Delhi
10. Sen, Amartya, Development as Freedom, OUP, New Delhi
11. Singh, Katar, Rural Development: Principles, Policies and Management, Sage, New Delhi

PANDIT DEENDAYAL PETROLEUM UNIVERSITY GANDHINAGAR										
SCHOOL OF TECHNOLOGY										
HS 313T Environment Development & Society										
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

Environment in India: air, water, land and agriculture, biodiversity; forests and wildlife

Unit II

Modern notions of development and challenges to environment in India: urbanization; increasing energy needs (nuclear, bio-fuel, solar); climate change

Unit III

Sustainable Development: gender and sustainable development; inclusion of sustainable development value in government function

Unit IV

Challenges of production and issues pertaining to consumption: Fair trade; Emerging Issues in Production rural systems and pressures due to urbanization. Measuring social development in the wake of the macro-processes of liberalization, privatization and globalization.

References:

1. Environment, development and society in contemporary India by Archana Prasad (2008), Macmillan India Limited, 438 Pages.
2. Sustainable Development: Linking economy, society, environment by Tracey Strange and Anne Bayley (2008), OECD Publishing, 142 pages.
3. Society And Environment by S. C. Naik and Tiwari (2009), Oxford & Ibh Publishing Co. Pvt Ltd, 316 pages.

PANDIT DEENDAYAL PETROLEUM UNIVERSITY GANDHINAGAR										
SCHOOL OF TECHNOLOGY										
HS 314T Organizational Psychology										
Teaching Scheme					Examination Scheme					
L	T	P	C	Hrs/Week	Theory			Practical		Total Marks
					MS	ES	IA	LW	LE/Viva	
2	0	--	4	2	30	60	10	--	--	100

UNIT I **07**

Definition and explanation of the term, 'industrial psychology' or 'occupational psychology'
 Objectives for studying industrial psychology
 Work place problems

UNIT II **07**

Ideal workplace environment and its effects
 Motivation and leadership
 Organizational behavior

UNIT III **06**

Relation between a personal and professional life
 Character, common sense and intellect
 Working in a team

UNIT IV **06**

Crisis management
 Decision making in an organization

Approximate Total 26 Hours

References:

1. Leadership: Theory and Practice, Peter G. Northouse
2. Working with Emotional Intelligence, Daniel Goleman
3. Industrial Psychology, Bulm and Nailen
4. Occupational Stress in Bureaucracy, S. Kumar
5. The Seven Habits of Highly Effective People, Stephen Covey