

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

Semester IV			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 202T	Numerical Techniques	3	1	-	7	4	30	60	10	-	-	100
2.	CE 211T	Advance Surveying	3	-	-	6	3	30	60	10	-	-	100
	CE 211P		-	-	2	1	2	-	-	-	25	25	50
3.	CE 212T	Fluid Mechanics - II	3	-	-	6	3	30	60	10	-	-	100
	CE 212P		-	-	2	1	2	-	-	-	25	25	50
4.	CE 213T	Environmental Engineering - I	3	-	-	6	3	30	60	10	-	-	100
	CE 213P		-	-	2	1	2	-	-	-	25	25	50
5.	CE 214T	Concrete Technology	2	-	-	4	2	30	60	10	-	-	100
	CE 214P		-	-	2	1	2	-	-	-	25	25	50
6.	CE 215T	Structural Analysis - II	3	1	-	7	4	30	60	10	-	-	100
		TOTAL	17	2	8	40	27						800

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

PANDIT DEENDAYAL PETROLEUM UNIVERSITY GANDHINAGAR										
SCHOOL OF TECHNOLOGY										
MA202T Numerical Techniques										
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

UNIT I **10**

Numerical Solution of System of linear equations & non-linear equations: Solution of transcendental and non-linear equations by Bisection, Regula falsi, Newton's Raphson and Secant method. Solution of a system of linear simultaneous equations by LU Decomposition, Cholesky Decomposition, Jacobi and Gauss Seidel methods. Concept of Ill conditioned system

UNIT II **14**

Interpolation and Numerical Integration: Introduction of Finite differences, Operators, Newton Gregory, Forward Interpolation Formula, Newton Gregory Backward Interpolation Formula, Gauss's Forward and Backward Interpolation Formula, Stirling's Central Difference Formula, Lagrange's Interpolation Formula for unevenly spaced data, Inverse Interpolation, Divided Differences, Properties of Divided Differences, Newton's, Divided Difference Formula, Relation between Divided Differences and Ordinary Differences. Formulae for Derivatives, Newton-Cotes's Quadrature Formula, Trapezoidal rule, Simpson's one-third rule, Simpson's Three-Eighth rule, Weddle's rule, Romberg's method, Double Integration. Numerical solution of first order ordinary differential equation by Taylor series method, Picard's method, Euler's method, Modified Euler's method and Runge-Kutta (4th order only) method. Multi step methods: Adams - Moulton method and Milne's method

UNIT III **06**

Probability: Various approaches of probability-classical, frequency (statistical), subjective and axiomatic. Theorems on probability, conditional probability, independence, Bayes Theorem. Random variable-discrete and continuous. Distribution function and their properties, probability mass and density functions

UNIT IV **10**

Statistics: Mathematical expectation, Moment generating function and its properties. Probability distributions: Bernoulli, binomial, negative binomial, Poisson and normal distributions. Theory of least squares and curve fitting. Correlation-Simple, multiple and partial, Regression lines and regression coefficients.

APPROXIMATE TOTAL 38 Hours

References:

1. Numerical Methods in Engineering and Science with Programs in C & C++ by B.S. Grewal, Khanna Publisher (2010)
2. Introductory Methods for Numerical Analysis by S.S. Sastry, Fourth edition, Prentice Hall of India (2009)
3. Numerical Methods for Scientific and Engineering Computation by M.K. Jain, S.R.K. Iyenger and R.K. Jain, 5th edition, New Age International (2007)

4. Fundamentals of Mathematical Statistics by S.C. Gupta and V.K. Kapoor, S. Chand Publisher (2007)
5. Advanced Engineering Mathematics by R.K. Jain & S.R.K. Iyenger, 3rd edition, Narosa (2002)

PANDIT DEENDAYAL PETROLEUM UNIVERSITY GANDHINAGAR										
SCHOOL OF TECHNOLOGY										
CE211T Advance 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

12

Curve setting: Designation of curves, setting out simple circular curve, methods of curve setting, obstacles to the location of curves, compound and reverse curve, setting out compound curve, spiraling compound and reverse curves, transition curves, length of a transition curve, ideal transition curve, characteristics of a transition curve, vertical curves, types and length of a vertical curve, setting out a vertical curve, sight distance, applications of site distance in transport planning

UNIT II

08

Hydrographic surveying: Need of a hydrographic survey, shore line survey, survey inside water bodies, methods of locating soundings, plotting of soundings, tides, tide gauges, mean sea level, Route surveying: reconnaissance survey, preliminary survey, location survey, construction survey

UNIT III

08

Photogrammetric surveying: Basic principles, elevation of a point by photogrammetric measurement, scale of a vertical photographs, determination of flying height, tilt and relief, stereoscopic vision, parallax in aerial stereoscope, effects of change of elevation and parallax, parallax bar and numerical

UNIT IV

10

Geographical information system: Introduction & Principle of Geographical Information System(GIS), components of GIS, applications. Remote sensing and GPS: principles of remote sensing, EMR, concept of signature, resolution, types of sensors, visual and digital image processing, image interpretation, applications in civil engineering, Global positioning system: definition, principles, map making using GPS, transferring data into computer, numerical.

APPROXIMATE TOTAL 38 Hours

References:

- Higher Surveying, AM Chandra, New Age International Publishers
- Surveying Vol-II, BC Punamia, AK Jain, Laxmi Publishing
- Principles of Geographical Information Systems, by Peter A. Burrough, Rachael McDonnell
- Remote Sensing and Image Interpretation, by Thomas M. Lillesand, Ralph W. Kiefer
- GPS: Theory and practice, by B Hofman Wellenhof, H Lichtenegger

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SCHOOL OF TECHNOLOGY										
CE211P Advance Surveying										
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. Setting out a simple circular curve
2. Setting out simple circular curve using 2-theodolite method
3. Tidal analysis from hydrographic survey data
4. Rapid visual survey for route in a city
5. Determination of difference in height of a buildings/objects using stereo pair photographs
6. Visual image interpretation and identification of objects in a satellite image
7. Mapping of an area using global positioning system
8. Field project using global positioning system
9. Applications of GIS Softwares

PANDIT DEENDAYAL PETROLEUM UNIVERSITY GANDHINAGAR										
SCHOOL OF TECHNOLOGY										
CE212T Fluid Mechanics-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**

Dimensional and Model Analysis: Primary and secondary quantities, Dimensional homogeneity, importance of dimensional analysis, methods of dimensional analysis, Rayleigh's method and Buckingham's methods, repeating variables, Similarity laws and model studies, dimensionless numbers, model testing of partially and submerged bodies, classification of models, undistorted and distorted models

UNIT II **10**

Open channel flow: Classification of flow in channels, geometry elements in channel section, velocity distribution in a channel, Chezy's formula, Uniform flow, Chezy's, Kutter's and Manning's equation, most economic sections of a channel, rectangular, trapezoidal, circular and triangular channel sections

UNIT III **10**

Critical flow in channel, normal and critical slopes, specific force, computations for critical velocity and critical depth, hydraulic jump, expression for hydraulic jump, length of hydraulic jump, gradually varied flow, characteristics of gradually varied flow, computations of gradually varied flow in channels, applications of critical flow concepts

UNIT IV **10**

Orifices and Mouth pieces: Classification of orifices, hydraulic coefficients, flow through large orifices, time of emptying a tank; Notches and Weirs: classification of notches, discharge over a triangular notch, velocity of approach, Francis's and Bazin's formula, discharge over submerged weir

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
3. Fluid flow in pipes and channels, GL Asawa, CBS Publishers

PANDIT DEENDAYAL PETROLEUM UNIVERSITY GANDHINAGAR										
SCHOOL OF TECHNOLOGY										
CE212P Fluid Mechanics-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. Calibration of triangular notch for field installation
2. Study on velocity distribution in an open channel
3. Study phenomena of hydraulic jump
4. Study on critical depth of flow
5. Orifice and mouthpiece apparatus
6. Calibration of rectangular notch
7. Pump performance and efficiency
8. Wind tunnel model apparatus

PANDIT DEENDAYAL PETROLEUM UNIVERSITY GANDHINAGAR										
SCHOOL OF TECHNOLOGY										
CE213T Environmental 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 **08**

General requirement for water supply , Quality and quantity of water, Domestic water quality standards; Water analysis (ISO, WHO standards), Sources of water and their yield, Water supply forecast, population forecast, variation in demand pattern, design period; Intakes, pumping and transportation of water

UNIT II **08**

Physical, chemical and biological characteristics of water and their significance, water quality criteria, appurtenances of water treatment and distribution systems, pump, pumping systems, pipes and fittings

UNIT III **16**

Designing a water treatment plant, process of treatment, mixing, aeration, sedimentation, coagulation, disinfection, softening, distribution systems- analysis and distribution of network, layout of distribution system, methods of water supply, distribution reservoir, capacity of reservoirs

UNIT IV **04**

Introduction to water supply software, waterCAD, EPANET2

APPROXIMATE TOTAL 36 Hours

References:

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

PANDIT DEENDAYAL PETROLEUM UNIVERSITY GANDHINAGAR										
SCHOOL OF TECHNOLOGY										
CE213P Environmental 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 turbidity, chlorine, pH, and hardness
2. Determination of turbidity using Aluminum sulfate-Jar test
3. Determination of chlorine demand and chloride residuals
4. Analysis of water quality, quantity parameters in a water supply system
5. Determination of various parameters in water treatment plant
6. Designing a water distribution systems
7. Software practice

PANDIT DEENDAYAL PETROLEUM UNIVERSITY GANDHINAGAR										
SCHOOL OF TECHNOLOGY										
CE214T Concrete Technology										
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

02

General: Historical background, composition of concrete, general note on strength mechanism, current practice and future trends.

UNIT II

08

Ingredients of Concrete: Cement- Chemical composition, hydration, heat of hydration, hydrated structure, various types of cement, testing of cement as per Indian standard, Aggregates-Function in concrete, classification, effect of geometry & texture, strength, mechanical properties, moisture content, water absorption, bulking of sand, deleterious substances, sieve analysis, various grading and grading requirements, sampling & testing as per Indian Standards, Water- General Requirements & limiting values of impurities, Admixtures- Additives and admixtures, types, need and benefits Mineral admixture - Fly ash, silica fume, blast furnace slag, and other pozzolanic materials. Chemical admixtures - Accelerator, retarder, water reducing elements, plasticizer and super-plasticizer, their functions and dosage

UNIT III

08

Fresh concrete: Methods of mixing, transporting and placing of concrete. Workability – Definition and need, factors affecting workability, various tests as per IS and ASTM. Segregation and bleeding, stiffening, re-tempering. Curing: necessity and various methods, micro-cracking.

Hardened concrete: Compressive and tensile strength and their relationship, various tests as per IS and ASTM. Factors affecting strength – water cement ratio, gel space ratio, aggregate cement ratio, properties of ingredients, and effect of age, maturity, and aggregate cement-paste interface various finishes of concrete. Introduction to aspects of elasticity, shrinkage and creep. Tests for strength of concrete: Destructive, semi destructive and non- destructive tests with their limitations, test methods as per IS and ASTM.

UNIT IV

06

Concrete mix design: Principles of mix proportioning, probabilistic parameters, factors governing selection of mix. Road note - 4, DOE, ACI and IS method of concrete mix design, Variability of test results, acceptance criteria, various IS code provisions. Recent Advances in Concrete: Ready mixed concrete, Light weight concrete, fiber reinforced concrete, Polymer concrete, etc..

APPROXIMATE TOTAL 24 Hours

References:

1. A.M.Neville and J.J.Brooks "Concrete Technology", Second Edition 2010
2. M.S.Shetty "Concrete Technology: Theory & Practice", S. Chand Publication,2005
3. M.L.Gambhir "Concrete Technology", 3rd Edition,2004
4. A.R.Shanthakumar "Concrete Technology", Eight Edition,

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SCHOOL OF TECHNOLOGY										
CE214P Concrete Technology										
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:

Sr No.	Practical Description
Tests on Aggregates (CA & FA)	
1	Sieve analysis for Coarse and Fine aggregates
2	Determination of aggregate crushing value
3	Determination of aggregate impact value
4	Determination of Specific Gravity and water absorption
5	Determination of Bulk density of coarse and fine aggregates
6	Shape test for coarse aggregates
7	Los Angeles abrasion test for Aggregates
Tests on Cement	
8	Determination of consistency of standard cement paste
9	Determination of Initial setting time and final setting time for Ordinary Portland Cement
10	Determination of soundness of cement by Le-Chatelier apparatus
11	Determination of Compressive strength of cement
Tests on Concrete	
12	Compaction factor test for concrete workability
13	Slump test for concrete workability
14	Compressive strength of concrete cubes and cylinders
15	Split cylinder test for concrete
16	Rebound hammer test for concrete (NDT)
17	USPV test for concrete
18	Concrete Mix Design

PANDIT DEENDAYAL PETROLEUM UNIVERSITY GANDHINAGAR										
SCHOOL OF TECHNOLOGY										
CE 215T Structural Analysis-II										
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

UNIT I **09**

Deflection of determinate beams: Analysis of beams and non sway frames by moment distribution and slope deflection methods. Effect of sinking of support.

Strain Energy: Strain energy in tension, Concept of thick and thin cylinders, and analysis of thin cylinders. Compression, torsion and bending, Castigliano's theorems, virtual work principles, Analysis of trusses by statistical methods. (Method of sections and method of joints). Deflections of determinate pin jointed frames

UNIT II **10**

Rolling loads and influence lines: Maximum S.F. and B.M curves for various types of rolling loads, focal length, EUDL, influence lines for shear force and bending moment for determinate beams. Influence lines for member forces in pin jointed trusses.

UNIT II **10**

Eddy's Theorem. Two hinged arches, Rib shortening and temperature effects, Influence lines for arches.

UNIT IV **10**

Matrix methods of analysis: Introduction and applications of flexibility method and stiffness methods for analysis of beams, Trusses and plane frames.

APPROXIMATE TOTAL 39 Hours

References:

1. Timoshenko and young, 'Strength of Materials', Von Nostrand East West Press.
2. Structural Analysis: Hibler
3. E.P. Popov 'Mechanics of Materials' Prentice Hall India.
4. B.C. Punmia 'Strength of Materials & Mechanics of Structures', Vol. 1, Standard Book House.
5. C.S.Reddy, Basic Structural Analysis, Tata McGraw-Hill Publishing Company Limited, New Delhi,2003.
6. S.B.Junnarkar & H.J.Shah, Mechanics of Structures, Vol-II, Charotar Publishing House, Anand,2007.