Course Code: CE201	Course Title Building Planning & DrawingTPC223						
Version No.	1.0						
Course Pre-requisites/ Co- requisites	ME 102						
Anti-requisites (if any)	None						
Objectives:	 To understand various materials used To understand configuration of various building components To learn initial planning of building services Use various code provisions for correct construction practices 						

Course Outcomes	Course Outcome Statement	PO's / PSO's
CO1	Knowledge of different types of materials used for building construction	PO1, PO2, PO3, PO5/ PSO1, PSO2
CO2	Understanding types of doors, windows, staircases, masonry, floors, roofs and their uses	PO1, PO2, PO3, PO5/ PSO1, PSO2
CO3	Knowledge of materials based on type of building work and suitable type of flooring, plastering, plumbing to be carried out	PO1, PO2, PO3, PO5/ PSO1, PSO2
CO4	Knowledge of specifications of critical building services	PO1, PO2, PO3, PO5/ PSO1, PSO2
CO5	Knowledge of Acoustics and Finishes	PO1, PO2, PO3, PO5/ PSO1, PSO2
	TOTAL HOURS OF INSTRUCTION	ONS: 30

Module No. 1 Introduction to Building Materials

6 Hours

Bricks: Classification, ingredients, different tests and its applications; **Timber:** It's Varieties, defects, tests, seasoning, applications; Application of Plywood and Veneers; Tests for fine aggregates. **Brick masonry (Bonds)**; Purpose, methods and defects of plastering, damp proofing. Requirements of good floors; Selection of flooring materials; Types of roof and different roofing materials; Types of doors and Windows. Planning of Residential Buildings, Site Selection criteria. Principles of Building planning. Significance Sun diagram. Wind Diagram. Orientation, Factors affecting, criteria under Indian condition.

Module No. 2Building Planning6 Hoursbye laws & regulations as per SP-7, 1983 National Building code of India group 1 to 5. Planning of Residential
Building (Bungalows, Row Bungalows, Apartments and Twin Bungalows) Procedure of Building Permission,
significance of commencement, plinth completion or occupancy certificate. Low cost Housing-Materials & Methods
(conceptual introduction only) Maintenance, Repairs, Rehabilitation of Structures. (conceptual introduction only)6 HoursModule No. 3Building Services6 Hours

Module No. 3	Building Services	6 Hours
Plumbing system, Var	ious Materials for system like PVC, GI, AC, CI, HDPE, and Stor	neware. Various types of
traps, Fittings, Chambe	ers, Need of Septic Tank, Concept of Plumbing & Drainage plan,	introduction to rainwater
harvesting. Concept of	rain water Gutters. Rainwater outlet & Down Tank Systems.	

Module No. 4	Electrification and Insulation	6 Hours								
Electrical wiring: Concealed & Open Wiring, Requirements & Location of various points, Concept of earthing. Fire										
resistance in building:	Fire protection precautions, confining of fire, fire hazards, Chara	cteristics of fire resisting								
materials, building ma	terials and their resistance to fire. Ventilation: - Definition and	necessity of Ventilation,								
functional requirement	, various system & section criteria. Air conditioning: - Purpose,	Classification, Principles,								
Systems & Various C	Components of the same. Thermal Insulation: - General conce	pt, Principles, Materials,								
Methods, Computation of Heat loss & heat gain in Buildings.										

Mod	lule No. 5	Acoustics and Finishes	6 Hours
Intro	duction to Acous	tics: Absorption of sound, various materials, Sabine's	formula, optimum reverberation time,
condi	tions for good a	coustics. Sound Insulation: Acceptable noise lev	els, Noise prevention at its source,
Trans	mission of noise	Noise control-general considerations. Building Fi	inishes: Paints: Different types and
applic	cation methods. V	arnishes & application methods. Plastering, Pointing	& various techniques. Tile cladding,
skirtiı	ng, dado work wi	th various materials. Miscellaneous finishes such as	POP, sand blasting techniques, wall
paper			
Text	t Books		
1.	Basic Civil Engli	leering and Engineering Mechanics by S. S. Bhavikat	ti, New Age International Publications
2	2022. A Taythook of Su	reversing and Lovelling Author P. Ager Khanne Publi	shars 12 th (Latest Print 2024)
2. 3	Civil Engineering	a Construction Materials, S.K. Sharma, Khanna Publish	shers, 12 (Latest Fillt 2024).
Refe	CIVII Eligineering	, construction Materials, S.K. Sharma, Khanna I uonsi	ing 1100se, 2024
Ken	1 Basic Civil En	gingering by G. K. Hirschar, Dhannat Pai Publication	2018
	1. Dasie Civii Eli	gineering by O. K. Infaskar, Dhanpat Kar Fubication.	2018
-	2. Surveying vol	.i, vol.ii, vol.iii by B.C. Punmia, Laxmi Publication.	
-	3. Irrigation Eng	neering by B. C. Punmia, Dhanpat Rai Publications	
	Exercise		
1.	Introducing AU	TOCAD, specify and use of various AUTOCAD Com	mands
2.	Creating floor p	atterns, drawing simple objects like door, window, star	irs etc
3.	AUTOCAD 2D	drawing plan, elevation, section using all the 2D com	mands.
4.	Buildings with	load bearing walls including details of doors and windo	ows.
5.	Drawing to a sc	ale, draw on half imperial drawing sheet.	
	Foundations: -	Isolated, Combined Footing, Under Reamed Piles. (W	ith reinforcement details)
6.	Drawing to a sc	ale, draw on half imperial drawing sheet.	
	Masonry:-		
	A. Stone Mas	onry: UCR, Course Rubble	
_	B. Brick masc	nry: English bond, Flemish bond	
7.	Drawing to a sc	ale, draw on half imperial drawing sheet.	
	Doors, Window	vs and staircases:- Doors: T.W. Paneled Door, Windo	ows: T.W. Glazed Window.
0		Stairs: Dog legged and Open well	
δ.	Sketch Book/D	rawing Sneet/Computer Alded Drawing :	
9	Sketch Book/	The state of the s	
).	Stone masonry	y Ashlar Ashlar chamfered Polygonal and Dry mason	rv
10.	Sketch Book/E	Praving Sheet/Computer Aided Drawing :	
	Doors: Flush d	oors, Revolving door, Collapsible door and rolling shu	tter.
11.	Sketch Book/E	Prawing Sheet/Computer Aided Drawing :	
	Windows: Lou	vered window, Sliding Window, Bay window, Caseme	ent window,
	Dormer Winde	ow, Corner Window.	
12.	Sketch Book/D	rawing Sheet/Computer Aided Drawing :	
	A. Roofs: Lin	• Sketches of steel trusses for different spans.	
	B. Stairs: Qua	rter turn, bifurcated, Spiral, Geometrical.	
13	Skatch Book/Dra	wing Sheet/Computer Aided Drewing •	
15.	A R C C Lite	rals & Chaija	
	B. Timber Tr	isses: King Post and Oueen Post.	
14.	Taking standard di	awings of a typical two storeyed building including all	l MEP, joinery,
1	rebars, finishing a	nd other details and writing out a description of the Fac	cility in about 500 -700 words.
15.	Drawing 1 2D PL	AN of a house using AUTOCAD/SolidWorks commerce	cial code.
	-	~	
Note:	Use of SolidWor	ks or any other commercial code tool is also recommend	nded for all of the above practical

Textbook(s):

Rangwala, "Building Construction", Charotar Publishing House 34th Edition Pvt. Ltd., 2022.

Reference Books:

1. David Frey, "AutoCAD", BPB Sybex Publications

2. George Omura, "AutoCAD"

3. I.S. 962 - 1989 Code for Practice for Architectural and Building Drawings

4. Shah, Kale, Patki, "Building Drawing", Tata McGraw-Hill

5. SP 7- National Building Code Group 1 to 5 - B.I.S. New Delhi

6. Y. S. Sane, "Building Design and Drawing", Allied Book Stall, Pune

7. Rai, M., Jaisingh, M. P., "Advanced Building Materials and Construction" CBRI Publications, Roorkee, 1985.

8. Punmia, B. C., "Building Construction", Lakshmi Publications (P) Ltd., New Delhi, 2005.

9. Rajput, R. K., "Engincering Material", S. Chand Publication, 2008.

Course Type	Embedded Theory and La	ıb (ETL)		
Mode of Evaluation	Theory MST-1 MST-2 Assignment/Quiz Final Assessment Tes Laboratory	15 15 20 st 50	75%	
Prepared by	Dr. Anshu Tomar			
Recommended by the Board of Studies on				
Date of Approval by the Academic Council				

PO/PS O CO	PO 1	PO 2	PO 3	РО 4	РО 5	PO 6	PO 7	PO 8	РО 9	PO1 0	PO1 1	PO1 2	PSO 1	PSO 2
CO1	3	2	2	-	1	-	-	-	-	-	-	-	2	2
CO2	3	2	2	-	1	-	-	-	-	-	-	-	2	2
CO3	3	2	2	-	1	-	-	-	-	-	-	-	2	2
CO4	3	2	2	-	1	-	-	-	-	-	-	-	2	2
CO5	3	2	2	-	1	-	-	-	-	-	-	-	2	2

And

dwise

Course Code: CE202	Course Title Fluid Mechanics	ТРС	3	0	3
Version No.	1.0	-		•	
Course Pre-requisites/ Co- requisites	None				
Anti-requisites (if any)	None				
Objectives:	 To develop students understanding of the mechanics. To take up the basic concepts of fluids and essential in all engineering disciplines and engineers managing various fluids with all the solution. To provide the student with a specific knowl phenomena observed in mechanical engineering a pipe and flow measurement. 	basic p l fluid l espec sub disc edge re g system	flov ially ipli garo ms,	cipl ws y to nes ding suc	es of fluid as they are o the civil of the field. g fluid-flow h as flow in

Course Outcomes	Course Outcome Statement	PO's / PSO's								
CO1	Determine the fluid pressure and use various devices for measuring fluid pressure.	PO1,PO2, PO4, PO12/, PSO1								
CO2	Calculate hydrostatic force and use of law of conservation mass to fluid flow.	PO1,PO2, PO4, PO12/, PSO1								
CO3	Apply Bernoulli's equation to fluid flow problems and boundary layer theory to determine lift and drag forces on a submerged body.	PO1,PO2, PO4, PO12/, PSO1								
CO4	Apply appropriate equations and principles to analyze pipe flow problems.	PO1,PO2, PO4, PO12/, PSO1								
CO5	Use of different fluid flow measuring devices.	PO1,PO2, PO4, PO12/, PSO1								
	TOTAL HOURS OF INSTRUCTION	DNS: 45								

Module No. 1Introduction to Fluids9 HoursDefinition, Ideal fluids, real fluids, Newtonian and non Newtonian fluids. Properties of Fluids: Units of
measurement, Mass density, Specific weight, Specific volume, Specific Gravity, Viscosity, Surface tension and
Capillarity, Compressibility and Elasticity, Control volume concept9 Hours

Module No. 2	Hydrostatics	9 Hours							
Pressure and its measurement, fluid pressure at a point, Pascal's law, pressure and its relation with height,									
atmospheric, absolute, gauge and negative pressure, measurement of pressure through piezo-meter and various types									
of manometer. Total pro	essure, intensity of pressure, centre of pressure. Pressure on horizont	al, vertical, inclined and							
curved surface. Buoyan	cy, centre at Buoyancy, Meta centre and Meta centre height. Conditi	on of equilibrium of							
floating and submerged	body. Experimental and analytical method to determine Meta-centri	ic height. Pressure in case							
of accelerated rigid body motion.									
Module No. 3	Fluid Kinematics	9 Hours							

Types of fluid motion, methods of describing fluid flow - Langrangian and Eulerian method, Inviscid flows, velocity
and acceleration, flow rate, Continuity equation, Potential flows, flow lines, velocity potential and stream function,
Flownet its characteristic and utility, circulation and vorticity, Vortex flow - forced vortex flow, free vortex flow,
equation of motion for vortex flow, equation of forced vortex flow and free vortex flowModule No. 4Fluid Dynamics9 Hours

nergy processed by a fluid	body, Types of forces, Forces influencing flu	id motion, head-energy correction factor
uler and Bernoulli's equat	ions, application of Bernoulli's equation, Fl	ow measurement, momentum of fluid in
notion, momentum equation	and momentum correction factor, Applicatio	n of momentum equation, forces on a pipe
end, free jets.		
Module No. 5 Measu	rement of Flow	9 Hours
Orifice & Mouth piece Cla	ssification, hydraulic coefficients, experimenta	al determination of hydraulic coefficient,
discharge through all types	of office & mouthpiece, time of emptying th	he tank through orifice and mouthpiece,
Notches and Weirs Classif	ication, discharge through various types of	Notches and weirs, time of emptying a
reservoir or a tank with no	tches & weirs, Orifice meter Venturimeter, I	Nozzles and bend meter. Flow I hrough
Pipes: Introduction, Major	and minor losses of energy in pipes, hydraulic	gradient, total energy line, pipes in series,
pipes in parallel, flow throu	gh branched pipes, and hydraulic transmission	l of power.
Text Books		
1. Applied Fluid Mecho	anics – 8th Edition (2021), Robert L. Mott, Jos	seph A. Untener, Pearson.
 A Textbook of Fluid D.S. Kumar "Fluid N Fluid Mechanics for K. L. Kumar "Engin 2000. 	Mechanics and Hydraulic Machines, R. K. Ba Aechanics and Fluid power Engineering" S.K. Civil Engineers", Webber, N.B. 1995, Chapm eering Fluid Mechanics", , Eurasia Publishing	ansal, 2021. Kataria and Sons, sixth edition, 2021 an and Hall. house (P) Ltd. Ram Nagar New Delhi,
References		
1. Fluid Mechanics V.	L Streeter, and E.B Wylie, , McGraw Hill, 1	985, New York
 Theory and Applica Delhi. 	tions of Fluid Mechanics, K Subramanya , Tat	ta-McGraw Hill Publishing Co, 1993, Ne
 Introduction to Flu University Press, N 	id Mechanics E.J Shaughnessy,,, I.M Katz,, a ew Delhi	nd J.P Schaffer,. SI edition, 2005, Oxfor
4. Fluid Mechanics, F	M., White, 5th Edition, McGraw Hill, New Yo	ork.
Course Type	Theory (TH)	
	Theory	100%
	Examination-1 15	
Mode of Evaluation	Examination-2 15	
sidue of Evaluation	Assignment/ Quiz 20	
	Final Assessment Test 50	
Prepared by	Mr. Syed Mohd. Arif	
Recommended by the Board of Studies on		
Date of Approval by the Academic Council		

PO/PS O CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PSO 1	PSO 2
CO1	2	3	0	1	0	0	0	0	0	0	0	1	2	0
CO2	2	3	0	1	0	0	0	0	0	0	0	2	1	0
CO3	2	3	0	2	0	0	0	0	0	0	0	1	2	0
CO4	2	3	0	1	0	0	0	0	0	0	0	2	1	0
CO5	2	3	0	1	0	0	0	0	0	0	0	2	2	0

(S-M. ARIP)

Head when the civil Engineering Department of Civil Engineering Chandigarh Engineering College, Jhanjeri Mohali, Punjab 140307

Course Code: CE203	Course Title Strength of Material	ТРС	3	2	4			
Version No.	1.0							
Course Pre-requisites/ Co- requisites	None							
Anti-requisites (if any)	None							
Objectives:	 To make the students understand the stress and studifferent kind of loading To make the students understand how shear force shear stresses are generated under different loadin To understand the concept of buckling and crippli and eccentric load To understand deflection due to bending, torsion of in thin cylinders. 	ain beh , bendir g condi ng in condi	ng n itior olur ılar	or u iom is nns sha	inder the nents and due to axial ft and stress			

Course Outcomes	Course Outcome Statement	PO's / PSO's					
C01	Understand the concept of static equilibrium, deformations, and material constitutive behavior.	PO1, PO2, PO3, PO5/ PSO1, PSO2					
CO2Understand the concept of stress, strain, principal stresses, Mohr's circle and elastic behavior of materials according to Hooke's law. Develop SFD and BMD for different type of beams subjected to different types of loads.PO1, PO2, PO3, PO5/ PSO1, PSO2							
CO3	It improves the engineering knowledge about deflection and slope with design problems analysis. It also improves the engineering knowledge corresponding to bending and shear stresses in design of civil engineering infrastructure.	PO1, PO2, PO3, PO5/ PSO1, PSO2					
CO4	CO4Understand the behavior of columns and struts under axial loading, deflection due to bending,P						
CO5	CO5 Understanding of Torsion on circular shafts and failure stresses PO1, PO2, PO3, PO5/ in thin cylinders. PSO1, PSO2						
	TOTAL HOURS OF INSTRUCTIONS: 45						

Module No. 1Equilibrium and stress behaviour9 HoursConcept of Equilibrium: Loads, supports, reactions, displacements; Analysis of Trusses, finding reactions of beams.Analysis of Statically Determinate Structures. Stresses and Strains: Concept of stress and strain; Type of stressesand strains; Stress-strain diagrams for ductile, brittle materials; Generalized Hooke's law; Concept of working stressand factor of safety; Lateral strain, Poisson's ratio and Volumetric strain; Elastic moduli and relationship betweenthem; Bars of varying section, composite bars, thermal stresses.

Module No. 2	Stresses and Strains 9 Hours							
Concept of principal stresses, principal strains and principal planes; use of Mohr circle in computation of stresses and								
strains; Rectangular blo	strains; Rectangular block subjected to normal stress along and across two planes, combination of normal and							
tangential stress also wi	th shear stress. Introduction to the concept of shear force, bending n	noment and the sign						
convention; Shear force	e and bending moment diagrams for cantilever, simply supported and	d overhang beams						
subjected to point loads	, uniformly distributed loads, uniformly varying loads, moments or	their combination, point						
of contra flexure.								
Module No. 3	Bending and Shear Stresses	9 Hours						

Assumptions - theory of simple bending; Derivation of bending equation; Centroid and section modulus of various cross sectional shapes including rectangular, circular, I, channel, angle etc.; Determination of bending stresses, bending stress distribution across various beam sections; Determination of shear stress, shear stress distribution across various beam sections.

Module No. 4	Column and Strut		9 Hours					
Stability of Columns; b formula; Columns unde	uckling load of axially loaded colum reccentric load, lateral load.	ns with various end condition	ns; Euler's and Rankine's					
Module No. 5	Stresses in Shafts and Thin Cylind	ers	9 Hours					
Torsion of Circular S shafts; combined torsio loading of torsion and pressures; Normal stre Text Books 1. A Textbook of S 2. A Textbook of S 3.	hafts: Derivation of torsion equation a on and bending of circular shafts, princ l bending. Stresses and strains in t ss, tangential stress. Strength of Materials, R.K. Bansal (6th Strength of Materials, R.K. Rajput (7th	and its assumptions, applications ipal stress and maximum she in cylinders: spherical she in Edition, 2022) in Edition, 2022)	on of equation to circular ar stress under combined ells subjected to internal					
References1. An Introduction2. Strength of Materia3. Elements of State4. Solid Mechania5. Engineering Materia	n to the Mechanics of Solids', Cranda aterial', R.S KHURMI, N KHURMI', rength of Materials', Timoshenko, S. cs', Kazmi', S. M. A., TMH lechanics of Solids, E. P. Popov, Pears	ll, S. H., N. C. Dahl, and T. J. S CHAND and Young, D. H., DVNC, Ne	Lardner, McGraw Hill w York, USA					
 Lab Exercise To perform tensile determine various Determination of p Compression test of Testing of steel in Determination of h Determination of h Determination of h Determination of h Determination of h Study of behavior To verify the mom Comparison of ten Comparing elasticity To conduct torsion Compressive Test Deflection test on 	and compression test in ductile and b mechanical properties obysical properties of steel including st on brick torsion hardness of a material by Rockwell and mpact strength of a material by Izod an bending strength of a wooden beam spe atigue strength of a material of columns and struts with different er ent area theorem for slope and deflect sile behaviour of steel reinforcement b ty and compressive strength of variou test on the given specimen to find out on Cube simply supported beam	rittle materials and to draw str rength and ductility I Brinell hardness testing mac nd Charpy tests ecimen ad conditions ion of a given beam par of various diameters s grades of Bricks as per IS 10 t modulus of rigidity	ress-strain curve and to hine					
Course Type	Embedded Theory and Lab (ETL)						
Mode of Evaluation	Theory MST-1 MST-2 Assignment/Quiz Final Assessment Test Laboratory	Theory75%MST-115MST-215Assignment/Quiz20Final Assessment Test50Laboratory25%						
Prepared by	Dr. Anshu Tomar							
Recommended by the Board of Studies on Date of Approval by								
the Academic Counci	1							

PO/PS O CO	РО 1	PO 2	РО 3	PO 4	PO 5	РО 6	РО 7	РО 8	PO 9	PO1 0	PO1 1	PO1 2	PSO 1	PSO 2
CO1	3	2	2	-	1	-	-	-	-	-	-	-	2	2
CO2	3	2	2	-	1	-	-	-	-	-			2	2
CO3	3	2	2	-	1	_	-				_		2	2
CO4	3	2	2	-	1	_		-	-	-	-	-	2	2
CO5	3	2	2			-	-	-	-	-	-	-	2	2
		-	2	-	I	-	-	-	-	-	-	-	2	2

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Head Department of Civil Engineering Chandigarh Engineering College, Jhanjeri Mohali, Punjab 140307



Program Elective -1

Course Code: CE206	Course Titl	Course Title Surveying and Geomatics TPC 3 2 4								
Version No.	1.0				1	1				
Course Pre-requisites/ Co- requisites	None									
Anti-requisites (if any)	None									
Objectives:	1. D 2. W 3. Id co ar	escribe the function of surveying in civil er fork with survey observations, and perform entify and calculate the errors in meas preceded values for differentiallevel circuits agles for open or closed-loop traverses.	gineerin calcula urement , horizo	ng con tions. ts and ontal di	structior to dev stances,	ı. relop and				

CO_PO Manning

Course Outcomes	Course Outcome Statement	PO's / PSO's
CO1	Understand the concept, various methods, and techniques of surveying	PO1, PO4, PO7/ PSO1, PSO2
CO2	Perform linear and angular measurements	PO1, PO3, PO12/ PSO1, PSO2
CO3	Compute angles, distances, and levels for given area	PO1, PO4/ PSO1, PSO2
CO4	Apply the concept of tachometry survey in difficult and hilly terrain.	PO1, PO3, PO12/ PSO1, PSO2
CO5	Select appropriate instruments for data collection and	PO1, PO3, PO4, PO7/ PSO1, PSO2
05	survey purpose	
		45

TOTAL HOURS OF INSTRUCTIONS: 45

Introduction to Surveying

Module No. 1

8 Hours

Principles, Survey stations, Survey lines- ranging, direct &indirect ranging, Bearing and its measurement with prismatic compass, calculation of angles from bearings, Local Attraction Levelling: Principles of levelling- booking and reducing levels; differential, reciprocal levelling, profile levelling and cross sectioning. Digital and Auto Level, Errors in levelling; contouring: Characteristics, methods, uses; areas and volumes. Setting up the plane table and methods of plane tabling(Radiation and three-point problem only).

 Module No. 2
 Triangulation and Trilateration
 9 Hours

 Theodolite survey:
 Instruments, Measurement of horizontal and vertical angle; Balancing of Traverse, Omitted Measurements, Tachometry:
 Definition, determination of tachometer constants and reduced level from tachometric observations. Triangulation - network- Signals. Baseline - choices - extension of base lines - corrections - Trigonometric leveling .

Module No. 3Curves and Photogrammetry surveying9 HoursCurves: Elements of simple and compound curves – Method of setting out Transition curve – length of curve – Elements of
transition curve.Photogrammetry Surveying: Introduction, Basic concepts, flight planning; Stereoscopy, photographic mapping using
paper prints, mapping using stereo plotting instruments, mosaics, map substitutes.9 Hours

Module No. 4Modern Field Survey Systems10 HoursPrinciple of Electronic Distance Measurement, Modulation, Types of EDM instruments, Distomat, Total Station – Parts of a
Total Station – Accessories –Advantages and Applications, Field Procedure for total station survey, Errors in Total Station
Survey; Global Positioning Systems- Segments, GPS measurements, errors and biases, Surveying with GPS, LADAR (drone and
vehicle based).
Remote Sensing: Introduction – Electromagnetic Spectrum, interaction of electromagnetic radiation with the atmosphere and
earth surface, remote sensing data acquisition: platforms and sensors.

cartin sanace, remote s		
Module No 5	Engineering Survey	9 Hours

General requirements and specifications for Engineering project surveys, Reconnaissance, Preliminary and Locations surveys for highways, railways, and canals. Layout of culverts, canal structures, bridges, and buildings. Tunnels survey- correlation of underground and surface surveys

Text Books

- 1. Marcelo de Carvalho Alves & Luciana Sanches, Surveying with Geomatics, CRC Press, 2023.
- Daniel T. Gillins, Michael L. Dennis, Allan Y. Ng, Surveying and Geomatics Engineering: Principles, Technologies, and Applications, American Society of Civil Engineers (ASCE), 2022

References

- 1. Agor, R., Surveying, Khanna Publishers
- 2. Bhavikatti, S.S. Surveying & Levelling Volume I & II
- 3. Punmia, B.C., Jain, Ashok Kumar and Jain, Arun Kumar, Surveying Vol. I, II & III, Laxmi Publications

Lab Exercise

- 1. Instruments and Techniques
- 2. Chaining Across Obstacles
- 3. Measurement of bearing and angles with compass, adjustment of traverse by graphical method.
- 4. Different methods of leveling, height of instrument, rise & fall methods.
- 5. Measurement of horizontal and vertical angle by theodolite.
- 6. Determination of tachometric constants and determination of reduced levels by tachometric observations.
- 7. Plane table survey, different methods of plotting, three-point problem.
- 8. Determination of height of an inaccessible object.
- 9. Setting out of circular curves in the field using different methods:
- 10. Plotting of traverse using the Total Station and GPS.
- Project 1
- 12. Project 2
- 13. Project 3
- 14. Project 4
- 15. Project 5

Course Type	Embedded Theory and Lab (ETL)		
1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1	Theory	- Artest	75%	
	MST-1	15		
	MST-2	15		
Mode of Evaluation	Assignment/Quiz	20		
	Final Assessment Test	50		
and the second second second second	Laboratory	-	25%	
Prepared by	Dr. Gaurav Juneja			
Recommended by the			\mathbf{X} is the second s	
Board of Studies on	·			
Date of Approval by	- In the second			
the Academic Council	And the second states and the second states and			

PO/PSO	PO1	PO2	РОЗ	PO4	PO5	PO6	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
C01	3	-	-	2	t.	enter o	2					•	2	2
CO2	3			3		•	•						2	2
CO3	3	•	2						•	•		1	2	2
CO4	3			2	2	•	2		•		•		2	2
CO5	3	÷	2						•		,	1	2	2

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Department of Civil Engineering Chandigarh Engineering College, Jhanjeri Vehali, Punjab 140307

Course Code: CE213	Course	Title Engineering geology	трс	3	2	4
Version No.	1.0		-1		I	1
Course Pre-requisites/ Co- requisites	None					
Anti-requisites (if any)	None					
Objectives:	1. 2. 3. 4.	To know the importance of Engineering Engineering. To enable the students, understand what mi their formation and identification. To highlight significance/ importance/ role o construction of Civil Engineering structures. To enable the student, realize its importa Engineering Geology in Civil Engineering con	Geole nerals f Engir nce ar nstructi	ogy to and ro neering nd app ons.	o the C ocks are g Geolog olication	Civil and gy in s of
		CO-PO Mapping				

Course Outcome Statement	PO's / PSO's
Understand the significance of geological agents on earth surface and its L2 significance in Civil Engineering.	PO1, PO4, PO7/ PSO1, PSO2
Identify and understand the properties of minerals and rocks.	PO1, PO4/ PSO1, PSO2
Classify and measure the Earthquake prone areas, Landslides and subsidence to practice the hazard zonation.	PO1, PO3, PO12/ PSO1, PSO2
Investigate the project site for mega/mini civil engineering projects and site L3 selection for mega engineering projects like Dams, Reservoirs and Tunnels.	PO1, PO3, PO4, PO7/ PSO1, PSO2
Understand the importance of geology in engineering applications	PO1, PO3, PO12/ PSO1, PSO2
	Course Outcome StatementUnderstand the significance of geological agents on earth surface and its L2 significance in Civil Engineering.Identify and understand the properties of minerals and rocks.Classify and measure the Earthquake prone areas, Landslides and subsidence to practice the hazard zonation.Investigate the project site for mega/mini civil engineering projects and site L3 selection for mega engineering projects like Dams, Reservoirs and Tunnels.Understand the importance of geology in engineering

TOTAL HOURS OF INSTRUCTIONS: 45

Module No. 1Introduction8 HoursBranches of Geology, Importance of Geology in Civil Engineering with case studies, Weathering process of rock, rivers and geological work of rivers.8 Hours

Module No. 2	Mineralogy And Petrology 11 Hours								
Definitions of mineral and rock-Different methods of study of mineral and rock. Physical properties of minerals and rocks for									
megascopic study for the	he following minerals and rocks. Common rock forming minerals: Felds	par, Quartz Group, Olivine,							
Augite, Hornblende, Mi	ica Group, Asbestos, Talc, Chlorite, Kyanite, Garnet, Calcite and ore fo	orming minerals are Pyrite,							
Hematite, Magnetite, C	chlorite, Galena, Pyrolusite, Graphite, Chromite, Magnetite and Bauxite	2. Classification, structures,							
textures and forms of Ig	neous rocks, Sedimentary rocks, Metamorphic rocks, and their megascop	ic study of granite varieties,							
(pink, gray, green). Pegr	natite, Dolerite, Basalt etc., Shale, Sand Stone, Lime Stone, Laterite, Quart	zite, Gneiss, Schist, Marble,							
Khondalite and Slate.									
Module No. 3	Structural Geology	9 Hours							
Strike, Dip and Outcrop study of common geological structures associating with the rocks such as Folds, Faults, Joints and									
Unconformities- parts, types, mechanism and their importance in Civil Engineering.									
Module No. 4 Geology of Dams. Reservoirs and Tunnels 9 Hours									

Module No. 4Geology of Dams, Reservoirs and Tunnels9 HoursTypes and purpose of Dams, Geological considerations in the selection of a Dam site. Geology consideration for successful
constructions of reservoirs, Life of Reservoirs. Purpose of Tunnelling, effects, Lining of Tunnels. Influence of Geology for
successful Tunnelling.

Module No. 5	Module No. 5 Application of Geological Investigations							
Remote sensing for civil engineering applications; Geological conditions necessary for design and construction of Dams, Reservoirs, Tunnels, and Road cuttings — Hydrogeological investigations and mining — Coastal protection structures. Investigation of Landslides, causes and mitigation.								
Text Books 1. Practical Engin 2. Engineering & 3. Textbook of Er References 1. Engineering Go 2. Engineering Go 3. Geology for Er 4. 'Environmenta	 Text Books Practical Engineering Geology by Steve Hencher (2nd Edition, 2024) Engineering & General Geology by Parbin Singh Katson educational series 8th 2023 Textbook of Engineering Geology by K. N. Radhika & B. C. Prabhakar (2023) References Engineering Geology by SubinoyGangopadhay Oxford University press 1st edition, 2012. Engineering Geology by D. Venkat Reddy, Vikas Publishing, 2ndEdn, 2017. Geology for Engineers and Environmental Society' Alan E Kehew, 3rd edn., 2013) Pearson publications. 'Environmental Geology' (2013) K.S.Valdiya, 2nd ed., McGraw Hill Publications. 							
Lab Exercise1.Study of physical2.Study of physical3.Megascopical4.Megascopical5.Megascopical6.Structural geal7.Structural geal8.Structural Geal9.Structural Geal10.Interpretation11.Interpretation12.Interpretation13.Interpretation14.Completion of15.Project 1	 'Environmental Geology' (2013) K.S.Valdiya, 2nd ed., McGraw Hill Publications. Lab Exercise Study of physical properties and identification of Rock forming minerals. Study of physical properties and identification of Economic minerals. Megascopic description and identification of Igneous rocks. Megascopic description and identification of Sedimentary rocks. Megascopic description and identification of metamorphic rocks. Structural geology problems- Thickness of Beds. Structural geology problems- Strike and Dip. Structural Geology problems – Faults. Structural Geology problems – Bore Hole on three-point problems. Interpretation and drawing of sections for geological maps showing Tilted beds. Interpretation and drawing of sections for geological maps showing Folded beds. Arepretation and drawing of sections for geological maps showing Folded beds. 							
Course Type	Embedded Theory and Lab (ETL)							
Mode of Evaluation	Theory 75% MST-1 15 MST-2 15 MST-2 20 Final Assessment Test 50 Laboratory 25%							
Prepared by	Dr. Gaurav Juneja							
Recommended by the Board of Studies on Date of Approval by	Recommended by the Board of Studies on							
the Academic Council								

PO/PSO	PO1	PO2	DO3	PO4	POS	POG	PO7	POS	POQ	PO10	DO11	PO12	DSO1	DSO2
СО	FOI	F02	FOS	F04	FOS	FOU	F07	FUB	FOS	1010	1011	F012	F301	F 302
CO1	3	-	-	2	-	-	2	-	-	-	-	-	2	2
CO2	3	-	-	3	-	-	-	-	-	-	-	-	2	2

CO3	3	-	2							-	-
CO4	3		-	2	2	2		 	-	2	2
CO5	3		-	2	2	2		 		2	2
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Department of Civil Engineering Chandigarh Engineering College, Jhanjeri Mohali, Punjab 140307

Course Code: UCE101	Course Title Elements of Civil EngineeringTPC202								
Version No.	1.0								
Course Pre-requisites/ Co- requisites	None								
Anti-requisites (if any)	None								
Objectives:	 To understand the various components of a generic building system To choose the right dimensions for various building components To learn initial surveying for the excavation and construction Use various code provisions for correct construction practices 								

Course Outcomes	Course Outcome Statement	PO's / PSO's
CO1	Understand various components of a generic building system	PO1, PO2, PO3, PO5/ PSO1, PSO2
CO2	Choose the right dimensions for various building components	PO1, PO2, PO3, PO5/ PSO1, PSO2
CO3	learn initial surveying for the excavation and construction	PO1, PO2, PO3, PO5/ PSO1, PSO2
CO4	Use various code provisions for correct construction practices	PO1, PO2, PO3, PO5/ PSO1, PSO2
CO5	Use of Civil Engineering for basic societal infrastructure	PO1, PO2, PO3, PO5/ PSO1, PSO2
		ONG 20

TOTAL HOURS OF INSTRUCTIONS: 30

Module No. 1Relevance of Civil Engineering and Building Planning6 Hours							
Introduction, branches	of civil engineering, application of civil engineering in other A	llied fields. Principles of					
planning, introduction to Bye-Laws regarding building line, height of building, open space requirements, F.S.I.,							
setbacks, ventilation, sanitation as per municipal corporation area requirement.							
setbacks, ventilation, s	anitation as per municipal corporation area requirement.	jace requirements,					

Module No. 2Components of Building6 HoursA) Sub-structure: Types of soil and rocks as foundation strata, concept of bearing capacity, types of
foundation i.e. shallow and deep and their suitability. Shallow foundation such as wall foundation,
isolated foundation, deep foundation such as pile foundation. B) Super-structure: Elements of super-
structures and their functions

Module No. 3	Building Materials and Design6 Hours						
Use and properties of the following materialsConcrete – ingredients and grades, plain and reinforced							
cement concrete and i	ready mix concrete, bricks, steel, timber, roofing materials etc.	Introduction to types					
of loads, load bearing and framed structures.							
Module No. 4	Leveling	6 Hours					

Module No. 4Leveling6 HoursPrinciples of surveying, Classification of surveys, Chain Surveying, Introduction to metric chain and
tapes, error in chaining, nominal scale and R.F., ranging, chaining and offsetting, index plan, location
sketch and recording of field book, Chain and compass survey, Meridian, bearing and its types, system
of bearing, Types of compass: prismatic and surveyor's compass. Calculation of included angles, correction
for local attraction. Terms used in leveling, use of Dumpy level and Auto Level, temporary adjustments. Methods
of reduction of levels, types of leveling, Contours, characteristics of contours, use of contour maps.Module No. 5Introduction to Transportation, Environmental and 6 Hours

Irri	gation Engineering								
Components of rigid and fle	xible pavement, components of	f milway to als (D							
water supply scheme (flow diagram), Necessity of Irrigation, Types of Dams (Forther of Components of									
Text Books									
1. Basic Civil Engineering by S. S. Bhavikatti, New Age International Publications									
2. Civil Engineering Materials - Technical Teacher's Training Institute, Chandigart									
3. Surveying by N. Basak, Tata Mc-Graw Hill Publication.									
References									
1. Basic Civil Engineer	ingby G. K. Hiraskar, Dhanpat	Rai Publication							
2. Surveying Vol.I, Vol.II, Vol.III by B.C. Punmia, Laxmi Publication									
3. Irrigation Engineering by B. C. Punmia, Dhanpat Rai Publications									
Course Type	Theory (TH)								
	Theory								
	Examination-1	15	100%						
Mode of Evaluation	Examination-2	15							
	Assignment/ Quiz	20							
	Final Assessment Test	50							
Prepared by Dr. Anshu Tomar									
Recommended by the									
Board of Studies on									
Date of Approval by									
the Academic Council									

	PO/PSO	Dat													
	CO	101	PO2	PO3	P04	PO5	P06	P07	PO8	PO9	PO10	P011	P012	PSO1	P507
	CO1	3	2	2		1			-			_			1302
	CO2	3	2	2		-		- <u>^</u>	-	-		-	-	Z	2
				2	-	1	-	-	•	-	-	•	-	2	2
ļ	CO3	3	2	2	-	1	-	-	-	•					2
I	CO4	3	2	2	-	1		-		-				2	2
ľ	COF		-	-		-				-	-	-	-	z	2
L	205	3	2	2	-	1	-	-	-	-	-	-	-	2	
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Head Department of Civil Engineering Chandigarh Engineering College, Jhanjeri Mohali, Punjab 140307

Course Code	: CE204		Course Title Structural Analysis 7						4	0	4	
Version No. 1.0								1				
Course Pre-r requisites	equisites	s/ Co-	None									
Anti-requisit	es (if any	y)	None									
Objectives:		 The objectives of this course is to : Ability to analyze statically determinate and indeterminate structures. Evaluate reaction components o f structures using different methods and draw SFD, BMD and influence lines. To introduce the students to the concept of Cables and Archs methods in structural analysis. 										
			•	CC	D-PO Map	ping						
Course Outcomes	Course Outcome Statement]	PO's /	PS(D's		
CO1	Unders indeter	tand the ty minacies.	pes of s	structures a	ind determin	ne the	PO1, PO2, PO	D3, PO	5/ P	SO	1, PSO2	
CO2	Analys method	nalyse and draw SFD and BMD using Clapeyron's PO1, PO2, PO3 nethod.						03, PO	3, PO5/ PSO1, PSO2			
CO3	Evaluate the deflection and reaction components using PO1, PO2, PO3 strain energy methods.						03, PO	5/ P	SO	I, PSO2		
CO4 Analyse and draw SFD and BMD using slope deflection PO1, PO2, PO3 method and Moment Distribution method.						03, PO	5/ P	SO	I, PSO2			
CO5 Draw the influence line diagram for indeterminate PO1, PO2, PO2 beams and to analyse simple cables and arches.						03, PO	5/ P	SO	I, PSO2			
			ТОТА	L HOUR	RS OF INS	TRUCTIO	NS: 60					
Module: 1		Introduc	tion to S	Structural	l Analysis			1	0 ha	urs		
Types of St Determinate a	ructures and Indet	and load erminate b	s-Static eam-Pir	Indetermin Jointed ar	inacy-Interind Rigid joi	nal and E	xternal-Kinema	atic In	dete	ermi	nacy-Beams-	
Module: 2		Clapeyro	on's Thr	ree Momen	nt Equation	n Method		1	l ho	urs		
Analysis of F of supports-S Frames.	fixed bea ketch Sh	m-Propped lear force	d Cantil diagram	ever beam	and Contin ding mome	nuous bean nt diagram	n- For different for continuous	t types s beam	of l s ar	oad 1d F	ing-Yielding Ligid Jointed	
Module: 3 Strain Energy Method						1	l ho	urs				
Determination frames- Casti jointed frames	n of defl gliano's 5.	ection – C II Theore	Castiglia m to de	ano's I The etermine th	eorem-cont he reaction	tinuous bea s of contin	ams, pin jointe uous beams, p	d fran in join	nes ted	and frai	rigid jointed nes and rigid	
Module: 4 Displacement Method-Slope Deflection Method and Moment Distribution Method						12	12 hours					
Computation sway-Sketch	of slop Shear for	e and de ce diagram	flection	-Analysis ending mor	of Contin ment diagra	uous bean um for conti	ns and portal inuous beams a	frame nd por	s w tal f	vith Ìram	and without es.	
Stiffness calc Sketch Shear	ulation-I force dia	Distribution gram and l	n factor Bending	rs-Analysis g moment d	s of contin diagram for	uous beam continuous	n, portal frame s beams and por	es with rtal fra	n an mes	d v	vithout sway-	
Module: 5		Rolling I	Loads a	nd Influen	ice Lines, S	Simple Cab	oles and Arche	s 12	12 hours			

Rolling Loads-Types- Influence line diagram for different loading conditions-Muller Breslau principle, Influence line diagram for Determinate and Indeterminate beams.

Tension in simple cables-Three hinged arches and two hinged arches-Determination of normal thrust, bending moment and shear force.

Text Books

- 1. R.C. Hibbeler, Structural Analysis, 2022, Tenth Edition (SI Units), Pearson Education.
- 2. Debabrata Podder and Santanu Chatterjee, Introduction to Structural Analysis, 2022, First Edition, CRC Press.
- 3. R. Agor, Structural Analysis, 2022, Third Edition, Khanna Publishing House.

References

- 1. Devadas Menon, Structural Analysis, 2017, Second Edition, Alpha Science International Ltd.
- 1. R. C. Hibbeler, Structural Analysis, 2017, Ninth Edition, Pearson Education, UK.
- 2. Amin Ghali and Ramez Gayed, Structural Analysis Fundamentals, 2021, CRC Press.

Course Type	Theory (TH)		,
Mode of Evaluation	Theory Examination-1 Examination-2 Assignment/ Quiz	15 15 20	100%
Prepared by	Mr. Sourabh Dhiman	50	
Recommended by the Board of Studies on			
Date of Approval by the Academic Council			

PO/PS O CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	РО 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PSO 1	PSO 2
CO1	3	2	2	-	1	-	-	-	-	-	-		2	2
CO2	3	2	· 2	-	1	-	-	·-	-				2	2
CO3	3	2	2	-	1	-	-	-		-			2	2
CO4	3	2	2	-	1				-			-	2	2
CO5	3	2	2		1							-	2	2
		-	2		1	•	-	•		-	-	-	2	2

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Head Department of Civil Engineering Chandigarh Engineering College, Jhanjeri Mohali, Punjab 140307

Course Code: CE205			Course Title Concrete Technology	ТРС	3	2	4		
Ve	rsion No.		1.0						
Co req	urse Pre-requ Juisites	iisites/ Co-	None						
An	ti-requisites (if any)	None						
Objectives:			 Understand the classification of cement, aggregates, its manufacturing process and testing. Know the various types of materials used to make concrete, their influence on strength properties. Study the proportioning of concrete mix for different grades of concrete and concrete mix design Understand the durability aspects of concrete. To know the various types of special concrete and their properties. 						
			CO-PO Mapping						
Course OutcomesCourse Outcome StatementPO's / PSO's									

Outcomes	Course Outcome Statement	10\$/150\$							
CO1	Identify the quality of cement and aggregates by various testing methods as per standards.	PO1, PO4, PO7/ PSO1, PSO2							
CO2	Evaluate the workability and strength of concrete.	PO1, PO4/ PSO1, PSO2							
CO3	Know the various stages of concrete in concrete production and concrete Mix design.	PO1, PO3, PO12/ PSO1, PSO2							
CO4	Check the durability properties of concrete.	PO1, PO4/ PSO1, PSO2							
CO5	Knowledge of Special types of concrete	PO1, PO3, PO4, PO7/ PSO1, PSO2							
	TOTAL HOURS OF INSTRUCTIONS: 45								

Concrete Ingredients, Fresh Concrete and Admixtures

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Cement-Classification of cement-Testing of cement-Aggregates-Properties-Testing of aggregates as per Indian Standards-Quality of water.

Workability-Factors affecting workability-Various workability tests-Admixtures-Chemical admixtures-Mineral admixtures.

Module No. 2 **11 Hours Strength of Concrete** Mechanical properties of concrete-Compressive, Tensile, Flexural strength; Durability tests including permeability, carbonation, rapid chloride ion penetration etc.; Non-destructive testing methods; Acceptance and compliance requirements of concrete as per IS codes. Various stages of Concrete, Durability of Concrete Module No. 3 **10 Hours**

Mixers-Various types of concrete mixers-Handling- Pumpable concrete-Placing of concrete-Compaction-Curing Under water concreting-Curing.

Permeability- Sulphate attack-Attack by sea water-Acid attack-Alkali-aggregate reaction-Freezing and thawing Corrosion of reinforcement-Shrinkage-Plastic shrinkage-Drying shrinkage.

Module Module No. 4

Module No. 1

7 Hours Mix Design Concrete mix design-Factors to be considered for mix design-Variables in proportioning-Different methods of mix design-Indian Standard Method IS 10262.

Module No. 5	7 Hours								
Polymer concrete	composites-Recycled aggregate concrete-Fibre-reinforced concr	ete-Ferro cement-High							
performance concre	te-Self compacting concrete-Light weight concrete.								
Overview of MI	VAN construction technology, Components, Construction Pro	cess, Advantages and							
disadvantages									

Text Books

- 1. M.S. Shetty and A.K. Jain, *Concrete Technology: Theory and Practice*, 2021, Eighth Edition, S. Chand & Company Ltd..
- 2. Zongjin Li, Xiangming Zhou, and Hongyan Ma, *Advanced Concrete Technology*, 2022, Second Edition, Wiley.
- **3.** Dr. P. Manikandan, Dr. J. Abdul Bari, and Dr. P. Velumani, *Concrete Technology*, 2022, Mahi Publication.

References

- 1. Narayan V. Nayak, K.G. Guptha, and Purnanand P. Savoikar, *Textbook of Concrete Technology*, 2021, First Edition, Creative Books.
- 2. Dr. K. Gunasekaran, Dr. R. Annadurai, and Dr. J.S. Sudarsan, *Concrete Technology*, 2021, First Edition, ARS Publications.
- IS: 10262-2019, Concrete Mix Proportioning Guidelines (Second Revision), Bureau of Indian Standards, New Delhi.

Lab Exercise

- 1. Determination of fineness of cement by dry sieving.
- 2. Consistency test on cement.
- 3. Determination of setting time of cement.
- 4. Determination of specific gravity and soundness of cement.
- 5. Sieve analysis of coarse and fine aggregates.
- 6. Specific gravity and water absorption of fine aggregates.
- 7. Specific gravity and water absorption of coarse aggregates.
- 8. Measurement of workability of concrete by slump cone test.
- 9. Measurement of workability of concrete by compaction factor test.
- 10. Measurement of workability of concrete by Vee-Bee Consistometer.
- 11. Tests for determination of compressive strength of concrete.
- 12. Tests for determination of flexural strength of concrete.
- 13. Tests for determination of split tensile strength of concrete.
- 14. To test the concrete specimen by the non-destructive test methods namely rebound hammer-test.
- 15. To test the concrete specimen by the non-destructive test methods namely ultrasonic pulse velocity test.

Course Type	Embedded Theory and Lab	(ETL)	
	Theory		75%
	MST-1	15	
	MST-2	15	
Mode of Evaluation	Assignment/Quiz	20	
	Final Assessment Test	50	
	Laboratory		25%
Prepared by	Mr. Sourabh Dhiman		
Recommended by the			
Board of Studies on			
Date of Approval by			
the Academic Council			

PO/PSO	PO1	PO2	DO3	PO4	PO5	PO6		POS	POQ	PO10	DO11	DO12		PSO2
СО	P01	102	2 103	104			107	100	105	1010	1011	1012	F301	1.502
CO1	3	-	-	2	-	-	2	-	-	-	-	-	2	2
CO2	3	-	-	3	-	-	-	-	-	-	-	-	2	2

CO3	3	-	2				1.		1	2	2
CO4	3	•		2	2	2	L.	¥		2	2
COS	3			2	2	2				2	2

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Course Code: CE301	Course Title Hydrology and Irrigation Engineering	трс	3	0	3		
Version No.	1.0			,	,		
Course Pre-requisites/ Co- requisites	- NIL						
Anti-requisites (if any)	None						
Objectives:	 To interduce the concept of hydrological process, hydr water and hence to develop the habit of conservation resources. To expose the students to the principles of irrigation storage and diversion structures and canal irrigation, so necessity of irrigation. 	ological on and n conce o that th	extrer manag pt of ney can	nes, and ement o available underst	ground f water water, and the		

Course Outcomes	Course Outcome Statement	PO's / PSO's				
CO1	Understand the interaction among various processes in the hydrologic cycle.	PO1, PO4, PO7/ PSO1, PSO2				
CO2	Calculate the average annual rainfall of any area using the rain gauge data and inter-relations of various parameters as infiltration, evapotranspiration etc	PO1, PO4/ PSO1, PSO2				
CO3	Understand the various component of hydro graphs and able to estimate the run off.	PO1, PO3, PO12/ PSO1, PSO2				
CO4	Find the water requirement for different crops and able to proposed appropriate method of applying water.	PO1, PO3, PO4, PO7/ PSO1, PSO2				
CO5	Propose various irrigation techniques , requirements of the crop	PO1, PO3, PO4, PO7/ PSO1, PSO2				

Module No. 1Introduction of precipitation8 HoursHydrologic Cycle, History of Hydrology, Water-Budget Equation, , World Water Balance, Applications in Engineering, Sources
of Data.Forms of Precipitation, Characteristics of Precipitation in India, Measurement of Precipitation, Rain Gauge Network,
Mean Precipitation over an Area, Depth Area-Duration Relationships, MaximumIntensity/Depth-Duration-Frequency
Relationship, Probable Maximum Precipitation (PMP), Rainfall Data inIndia.

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iviodule No. 2	Abstractions from precipitation and Runoff	8 Hours							
Evaporation Process, Eva	aporimeters, Analytical Methods of Evaporation Estimation, Reservoir Evap	oration and Methods for its							
Reduction, Evapotrans	piration,Interception, Depression Storage, Infiltration, Infiltration C	apacity, Measurement of							
Infiltration, ModellingInfiltration Capacity, Classification of Infiltration Capacities, Infiltration Indices.Runoff Volume, SCS-CN									
Method of estimating runoff volume, Flow Duration Curve, Flow-MassCurve, Hydrograph, Factors Affecting Runoff									
Hydrograph, Components of Hydrograph, Base Flow Separation, Effective Rainfall, Unit Hydrograph Surface Water Resources									
of India, Environmental	of India, Environmental Flows.								
Module No. 3	Irrigation and its planning and application in India	8 Hours							
Necessity and importa	nce of irrigation, scope of irrigation engineering, benefits, and ill effects o	f irrigation. Development of							
irrigation in India, plar	nning of irrigation projects, concept of multi-purpose projects, major, me	edium, and minor irrigation							
schemes. Administratio	on, economics and financing of irrigation works and need for increasing irri	gation efficiency.							
Module No. 4	Water withdrawals and distribution system	8 Hours							
Water for Energy Production, Water for Agriculture, Water forHydroelectric Generation; Flood Control. Analysis of Surface									
Water Supply, Water Requirement of Crops-Crops and Crop Seasons in India, Cropping Pattern, Duty And Delta; Quality of									
Irrigation Water: Soil-WaterRelationships, Root Zone Soil Water, Infiltration, Consumptive use, Irrigation Requirement,									

Irrigation Water; Soil-WaterRelationships, Root Zone Soil Water, Infiltration, Consumptive use, Irrigation Requirement, Frequency ofIrrigation; Methods of Applying Water to The Fields: Surface, Sub-Surface, Sprinkler and Trickle / DripIrrigation.

Modula No. 5										
Wodule No. 5	Dams and spillways				13 Hours					
Embankment dams: Cla forces on gravity dams, components of spillways regulation, sedimentatio	ssification, design considerations, e causes of failure, stress analysis, el , types of gates for spillway crests;Re n, economic heightof dam, selection	stimatio ementa servoir of suita	n and control of ry and practical s- Types, capacity able site.	seepage,slop profile Arch ar of reservoirs	pe protection. Gravity dams: nd buttress dams. Spillways: , yield of reservoir, reservoir					
Text Books 1. Mohammad A 2. Lawrence K. M Hydraulics, Hydraulics, Hydraulic	lbaji, Introduction to Water Engineer Wang, Mu-Hao Sung Wang, Nazih drology and Management (4th Editio	ing, Hyc K. Sha n, 2024	frology, and Irrig mmas, Water a)	ation, CRC Pre nd Wastewat	ess, 2024 er Engineering, Volume 1:					
References										
 K Subramanya, Water Resources Engineering through Objective Questions, Tata McGraw Hill. 										
G L Asawa, Irrig	2. G L Asawa, Irrigation Engineering, Wiley Eastern									
L W Mays, Wate	er Resources Engineering, Wiley.									
Course Type	Theory (TH)									
	Theory			100%						
	Examination-1	15								
	Examination-2	15								
Mode of Evaluation	Assignment/ Quiz	20	N (1)							
			- 7 S.	5						
	Final Assessment Test	50								
Prepared by	Dr. Gaurav Juneja				·					
Recommended by the		d d h h	NAMES IN							
Board of Studies on										
Date of Approval by the Academic Council										

PO/PSO				2.20	ene uniqui	1	100	A.9		2. 19.10	1			
со	1 001	POZ	P03	P04	PO5	P06	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
C01	3	-	-	2		-	2	-	•	-	-		2	2
CO2	3	-		3		-	-			•			2	2
CO3	3	-	2		2. <mark>1</mark> . 19	1.		(ríg))		343 - 11-1		1	2	2
CO4	3	-	-	2	2		2	-		-	-	-	2	2
CO5	3		·	2	2		2	Sal -		` - `	-	-	2	2

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Department of Civil Engineering Chandigarh Engineering College, Jhanjeri Mohali, Punjab 140307

Program Elective -2

Course Code: CE207	Course Title Sewage & Solid Waste Engineering TPC 2 0 2
Version No.	1.0
Course Pre-requisites/ Co- requisites	None
Anti-requisites (if any)	None
Objectives:	 To identify and analyze different methods of treatment of solid waste. To manage construction and operations of landfill facilities, energy recovery systems and management of leachate systems. To acquire an understanding on the reduction, segregation and storage of wastes at source. Become aware of Environment and health impacts of solid waste mismanagement.
	5. Able to identify various laws related solid waste management.

Able to learn basic concepts of solid waste management, beginning from source generation to waste disposal in a system of municipality organizational structure. Able to identify the most common techniques for preventing, minimizing, recycling, disposing and treatment of waste and their application on site remediation	PO1, PO2, PO6, PO7,PSO1 PO1, PO6, PO7,PSO1
Able to identify the most common techniques for preventing, minimizing, recycling, disposing and treatment of waste and their application on site remediation	PO1, PO6, PO7,PSO1
Able to understand the processes involved in solid and hazardous waste management	PO1, PO2
To characterize the waste and apply the knowledge of laws for municipal solid waste management,	PO1, PO7,PSO1
Illustrate Industrial practices in solid, biomedical wastes and for handling of plastic wastes.	PO1, PO5
8 1 1 1	Solid and hazardous waste management To characterize the waste and apply the knowledge of laws for municipal solid waste management, Illustrate Industrial practices in solid, piomedical wastes and for handling of plastic wastes.

Module No. 1 Sewage

7 Hours

Domestic and Storm water, Quantity of Sewage, Sewage flow variations. Conveyance of sewage Sewers, shapes design parameters, operation and maintenance of sewers, Sewage pumping; Sewerage, Sewer appurtenances, Design of sewerage systems. Storm Water- Quantification and design of Storm water; Sewage and Sullage, Pollution due to improper disposal of sewage, Wastewater treatment, aerobic and anaerobic treatment systems, recycling of sewage – quality requirements for various purposes.

Module No. 2	Fundamentals of Solid Waste Management	6 Hours
Definition of solid w	vaste, Meaning of different solid waste - Domestic Waste, con	nmercial waste, industrial
waste, market waste,	agricultural waste, biomedical waste, E-waste, hazardous waste, in	stitutional waste
Sources of solid wa	ste, Classification of solid waste -hazardous and non-hazardo	ous waste. Physical and
chemical characteris	tics of municipal solid waste. Impact of solid waste on e	nvironment. Solid waste
management techniqu	ues - solid waste management hierarchy, waste prevention and wa	aste reduction techniques.
Factors affecting the s	solid waste generation.	

Module No. 3	Processing of Municipal Solid	Wester 6 Hours
Storage of solid was	te. Collection methods of solid w	Waste Tools and Equipment-Litter Bin, Broom, Shovels
Handcarts, Mechanic	cal road sweepers. Community bir	in a like movable and stationary bin. Transportation o
municipal waste, Tra	insportation vehicles with their capac	city. Role of rag pickers and their utility for society
Organization pattern	of solid waste management system, r	practices according to Population of the town or city.
Module No. 4	Disposal of Municipal Solid Wast	te 5 Hours
Concept of compositi Methods of composite technique, Factors to Ramp method. Leach	ng of waste, Principles of composting ting — Manual Composting, Mer be considered for site selection L ate and its control, Biogas from land	ng process. Factors affecting the composting process echanical Composting, Vermicomposting, Land filling Land filling methods-Area method, Trench method and Ifill.
Module No. 5	Industrial, E-Waste & Biomed	dical Waste Management 6 Hours
Industrial waste Ma Control measures E-waste Manageme waste. Disposal of E-	nagement: Variety of industrial was for industrial waste, Recycling of in nt: Definition of E- waste, Varietie waste.	ste, Collection and disposal of industrial waste ndustrial waste. es of E- wastes, Dangers of E- waste, Recycling of E
Riomedical Waste	management : Definition of Bio	medical Waste. Sources and generation of Biometrica
Waste Classification	of Biomedical Waste, Management t	technologies.
Text Books		
 Environmen Garg,Khann Sewage Tro House,17th Environmen Publishers,2 	a Publisher,43rd Edition,2024. eatment & Disposal & Waste Wate edition 2020. tal Engineering Sewage Waste Disp 024 Edition	nter Engineering (Vol. II), Dr. P. N. Modi, Standard Bool
References	D. C. D. end Ashol	k Jain Luxmi Publications
1. Waste Wate	r Engineering, B.C Punifila and Asher	
Course Type	Theory (TH)	1000/
Course Type	Theory	100%
	Examination-1	15
	Examination-2	15
Mode of Evaluation	Assignment/ Quiz	20
	Final Assessment Test	50
Prepared by	Mr. Vineet Pandey	We also and a second
Recommended by t	he	
Board of Studies on		
Date of Approval by the Academic Coun	cil	

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PO/PSO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO8	PO9	PO10	PO11	PO1 2	PSO1	2
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CO1	2	1			12.03%	1	-						2	
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CO2	2		a solution	Sec. 9.	11 × 15-1	d Carry	an after an							
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203							2						-	
CO4	2		N.C.		1.1	1.1.1	-	- FIT - 7 - 7						
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Head Department of Civil Engineering Chandigarh Engineering College, Jhanjeri Mohali, Punjab 140307

Course Code: CE209	Course Title Air and Water Pollution	TPC 2 0 2					
Version No.	1.0						
Course Pre-requisites/ Co- requisites	None						
Anti-requisites (if any)	None						
Objectives:	 To educate the students on Fundamentals of a control modeling. To explore the feasibility of design and operat water pollution control devices. 	ir and water pollution					

Course Outcomes	Course Outcome Statement	PO's / PSO's
C01	Able to understand the basic concepts and application of mathematical modeling in environmental engineering	PO1,PO2,PO3,PO4,PO5,PO6,PO8,P O9,PO11,PO12/ PSO2
CO2	Able to recognize the need of Application of advanced instrumental methods in environmental engineering	PO1,PO2,PO3,PO4,PO5,PO6,PO8,P O9,PO11,PO12/ PSO2
CO3	Able to comprehend with technologies available for the control of air pollution and decide and design an appropriate air pollution control system based on the problem at hand.	PO1,PO2,PO3,PO4,PO5,PO6,PO8,P O9,PO11,PO12/ PSO2
CO4	Able to comprehend with technologies available for the control of water pollution and decide and design an appropriate water pollution control system based on the problem at hand.	PO1,PO2,PO3,PO4,PO5,PO6,PO8,P O9,PO11,PO12/ PSO2
CO5		

TOTAL HOURS OF INSTRUCTIONS: 30

Module No. 1Modeling/Concept6 HoursEnvironmental management, Role of mathematical models; types of models, model development and
validation, model sensitivity – assessing model performance.6 HoursModule No. 2Introduction to Sampling, Measurement and Analysis6 Hours

Identify the sources a	and effect of Air pollution, standards and legislation in India, Role	e of M	leteorology and
Natural Purification	Processes, Transport and dispersion of air pollutants		

Module No. 3Design/ Modeling protocols for air6 HoursPrinciple and design of particulate matter control devices- gravitational settling chambers, cyclone
separators, bag-house filters, electrostatic precipitators, wet and dry scrubbers, design of gaseous pollutant
control devices, Dispersion Modeling and Plume behaviour.6 Hours

6 Hours Module No. 4 Source correction methods Vehicular pollution control, indoor air quality monitoring and control, Control of specific gaseous pollutants- Control of sulphur dioxide, nitrogen oxides emission. Design/ Modeling protocols for water and Groundwater Quality 6 Hours Module No. 5 Historical development of water quality models; rivers and streams water quality modelling - river hydrology depth and velocity and flow - low flow analysis - dispersion and mixing - estuarine transport, Models for lakes -Models for dissolved oxygen; Streeter - Phelps models. Mass transport of solutes, application of concepts to predict groundwater contaminant movement, seawater intrusion - basic concepts and modeling Text Books 1. Sewage Disposal and Air Pollution Engineering - Sewage Disposal and Air Pollution Engineering (Volume - 2) 43rd Latest 2024 edition at Khanna Publishers. 2. undamentals of Water Pollution: Quantifying Pollutant Formation, Transport, Transformation, Fate, and Risks by Daniel A. Vallero (2024) 3. Battling Air and Water Pollution: Protecting Our Planet's Vital Resources by Various Authors (2023)

References

- 1. Stern, A.C., "Air pollution Control: Vols 1, 2, 3". Academic press.
- 2. DeNevers., "Air Pollution Control Engineering", McGraw-Hill.
- 3. Magill, P. L.,"Air pollution hand book", McGraw-Hill.
- J.L. Schnoor., "Environmental Modeling Fate and Transport of Pollutants in Water, Air and Soil", John Wiley & Sons Inc.
- 5. Stern, A.C., "Air Pollutants, their transformation and Transport", Academic Press.

Course Type	Theory (TH)		1000/
Mode of Evaluation	Theory Examination-1 Examination-2 Assignment/ Quiz	15 15 20	100%
	Final Assessment Test	50	
Prepared by	Ms. Swati Pathak	14	
Recommended by the			
Board of Studies on			
Date of Approval by the Academic Council	· · · · · · · · · · · · · · · · · · ·		

PO/PS O	PO	PO 2	PO 3	PO 4	РО 5	PO 6	PO 7	PO 8	РО 9	PO1 0	PO1 1	PO1 2	PSO 1	PSO 2
CO			1	2	3	1	0	3	3	2	3	3	0	3
C01		3	-				0	3	3	2	3	3	0	3
CO2	1	3	1	3	3	-	0		1	2	3	3	0	3
CO3	1	3	3	3	3	1	0	3	3	-	3	3	0	3
CO4	1	3	3	3	3	1	0	3	3	2			0	3
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Head Department of Civil Engineering Chandigarh Engineering College, Jhanjeri Mohali, Punjab 140307

			Course Title			1					
Cor	urse Code: C	E217	Green Buildings And Energy Conser	rvation	ТРС	3	0	3			
Ver	'sion No.		1.0								
Cou req	urse Pre-requ uisites	iisites/ Co-	None								
Ant	ti-requisites ((if any)	None								
Ob	jectives:		 To inforce the basics of green design and sustainable development concepts. To identify various areas of implementing strategies for green design in projects to enhance the built environment. To know the significance of Indoor Air Quality To learn the energy conservation practices. To learn institutional guidelines for development and certification of green designs. 								
			CO-PO Mapping								
	Course Outcomes	Co	ourse Outcome Statement	PO's / PSO's							
	CO1	Demonstrate g Green buildin	green concept skills and apply tools of g assessment.	PO1, PO6,PO7/ PSO1							
	CO2	Select approj technique.	priate green building material and	PO1, PO2, PO6, P	PO7/ PS	501					
	CO3	Knowledge of	f sustainable practices	PO1, PO2, PO6,I	PO7/ PS	501					
	CO4	Energy efficie	ent civil engineering project.	PO1, PO2, PO6,I	PO7/ PS	501					
	C05	Carry out Gree guidelines.	en Building rating using IGBC	PO1, PO2, PO6,PO7/ PSO1							
		<u> </u>	TOTAL HOURS OF INSTRUCTIONS: 45								
Mo	dule No. 1	Green B	uilding Concept				10				
Ove stra des pro	erview of gre tegies of Gre ign; Introduct ject requireme	en building m en building and ion to High per ents and strategi	ovement; Concept of Green building d sustainable development; Objectives formance building; integrated design p les; Overview of various green rating sy	and sustainable Principles and Be process of high per ystems worldwide	develoj enefits forman	ome of (ce l	nt; I Greer uildi	ssues and 1 building ing; Green			
Mo	dule No. 2	Green B	uilding Materials and Indoor Enviror	nment Quality			11				
Introduction; Low emitting materials; Building and material reuse; Construction waste management; materials; Life cycle cost assessment of building materials and products; Factors affecting indoor env quality; Ventilation and filtration; Building materials and finishes- Emittance level; Indoor Environm practice						it; F nvi me	legio ronm nt qua	nal ent ality best			
Mo	dule No. 3	Water: F	teduce, Reuse and Recycle				06				
Intro	duction; Wast	e water strategy	and water reuse/recycling; Water fixtu	res and water use r	eductio	on s	trateg	gies.			
Mo	dule No. 4	Energy ef	ficient designs				09				
Passi	Passive cooling and day lighting- Active solar and photovoltaic- Building energy analysis methods-Building energy										

simulation- Building energy efficiency standards- Lighting system design- Lighting economics and aesthetics-Impacts of lighting efficiency- Energy audit and energy targeting- Technological options for energy management. Thermal comfort

L	I nermai comfort							
	Module No. 5	IGBC Guidelines	09					

Introduction; IGBC green new building Rating system – Overview and process – project checklist; Sustainable architecture and design; Site selection and planning; Water conservation and energy efficiency; Building materials and resources; Indoor Environment quality; Innovation and development

Text Books

- S.C. Arora, Green Building: Principles & Practices in Residential Construction, 2021, McGraw-Hill Education.
- 2. B.C. Punmia, Energy Efficient Buildings, 2022, Laxmi Publications.
- 3. Shah, Choudhury, and Rathi, Energy Conservation in Buildings, 2022, Tata McGraw-Hill.
- 4. R. K. Gupta, Energy Efficiency and Conservation in Buildings, 2021, Prentice-Hall India.

References

- 1. William B. Haskell, Green Building Handbook: Volume 1, 2021, Routledge.
- 2. Michael J. K. Bole, Building Green: A Complete Guide to Sustainable Architecture, 2022, Wiley.
- 3. U.S. Green Building Council, LEED Reference Guide for Green Building Design, 2021, USGBC Press.

Course Type	Theory (TH)	
Mode of Evaluation	Theory100%Examination-115Examination-215Assignment/ Quiz20Final Assessment Test50	
Prepared by	Mr. Sourabh Dhiman	
Recommended by the Board of Studies on	and the later of the second	
Date of Approval by the Academic Council	and the second	

PO/PSO CO	P01	PO2	PO3	PO4	PO5	P06	P07	PO8	P09	PO10	P011	P012	PSO1	PSO2
C01	2	1	•	-	•	1	3	-	•	-	-	-	1	-
CO2	2	1	- [-	1	3	-	£ -	-	-	-	1	
СО3	2	1	. .	^R	193 <u>8</u> - 4	1	3	1					1	
CO4	2	1		-	1	1	3	-	•	•			1	-
CO5	2		•	•		1	3	-	-	-			1	

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Department of Civil Engineering Chandigarh Engineering College, Jhanjeri Mohali, Punjab 140307

Program Elective -3

Course Code: CE218	Course Title Material Testing & EvaluationTPC303
Version No.	1.0
Course Pre-requisites/ Co- requisites	None
Anti-requisites (if any)	None
Objectives:	 To know and understand various engineering materials Course helps students to know about the testing procedure and various test regarding engg.material Course helps to know about the various IS code of different materials To understand the quality control for various engineering projects

Course Outcomes	Course Outcome Statement	PO's / PSO's						
C01	Identify building materials and their properties.	PO1,PSO1						
CO2	Able to test the materials before their actual use at the site.	PO1, PO4,PSO1						
CO3	Understand various IS codes for different engineering materials	PO1, PO4, PSO1, PSO2						
CO4	Assess quality control measures pertaining to construction materials.	PO1, PO2, PO4,PSO1						
CO5	To understand the Indian standard codes concept.	PO1, PO12, PSO1, PSO2						
	TOTAL HOURS OF INSTRUCTIONS: 45							

Module No. 1Introduction to Engineering Materials15 HoursTypes, properties, advantages and uses of: Cement; Concrete; Admixtures; Glass and Plastics; Paints and

Varnishes, Acoustical material; Geo-synthetics, Bitumen and Asphalt; Ceramics and Refractory's ;Bricks; Concrete hollow blocks & Interlocking tiles.**Sand:** Composition, types, Physical Properties, uses. Fly ash: Source, types, properties and uses Timbers: Properties, Seasoning, defects, preservation methods.

Module No. 2	Ferrous and nonferrous metals	9 Hours					
importance of Structural steel their characteristics and mechanical behaviour (elastic, plastic and elasto plastic,							
strength and durabili	ity w.r.t Climatic variation); Creep - fundaments and characterist	ics, concept of fatigue of					
materials; Impact tes	t, toughness – different materials.						
Module No. 3	Testing Procedures	10 Hours					
For bricks, reinforc	ing steel, fine aggregates, coarse aggregates, Physical identific	ation of tests for soils.					
Documenting the exp	perimental program, including the test procedures, collected data, me	ethod of interpretation and					
final results.							
Module No. 4	Quality control	4 Hours					
Use of test data/ te	Use of test data/ testing reports in the material selection for various civil engineering projects /construction,						
Sampling, Acceptance criterion							
Module No. 5	IS Code & Practices	7 Hours					
Code of practice an	Code of practice and guidelines in this regards for Cements; Aggregates; Concrete (plain and reinforced); Soils;						

Bitumen and asphaltic materials; Timbers; Glass and Plastics; Structural Steel.

Text Books

- Khanna, S.K., Justo, C.E.G and Veeraragavan, A, ' Highway Materials and Pavement Testing', Nem Chand & Bros, Fifth Edition, 2023
- 2. Testing & Evaluation of Civil Engineering Materials, Dr.S Chaudhary, Dr.Kashyap A.Patel, 2023
- 3. Testing of Construction Materials, Bahurudeen A, P.V.P Moorthi, CRC Press, 2020

References

1. Chudley, R., Greeno (2006), 'Building Construction Handbook' (6th ed.), R. Butterworth- Heineman

Course Type	Theory (TH)		
	Theory		100%
	Examination-1	15	
	Examination-2	15	
Mode of Evaluation	Assignment/ Quiz	20	
	Final Assessment Test	50	
Duananad by	Mr. Vinest Panday		
Prepared by	WIF. Vineet Fandey		
Recommended by the			
Board of Studies on	in the second second second second		
Date of Approval by			
the Academic Council	a second s		

PO/PSO	РО	РО	PO	PO	PO	PO 6	PO 7	PO8	PO9	PO10	PO11	PO1 2	PSO1	PSO 2
CO	1	2	3	1000	1 miles			11					1	
C01	2		1.134	ing all	19.62		322	1. 1.4				-	1	
CO2	2			2	1			-	There				2	<u> </u>
CO3	2			1	Jack.	2	See. 1						1	1
CO4	2	1	ST.	2	-	1.5	1.7.5	a de	in a				1	1
C05	2	100		1280					Ber - C	0		1	1	1

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Head Department of Civil Engineering Chandigarh Engineering College, Jhanjeri Mohali, Punjab 140307

Course Code: CE219	Course Title Water Supply Engineering TPC 3 0 3							
Version No.	1.0							
Course Pre-requisites/ Co- requisites	None							
Anti-requisites (if any)	None							
Objectives:	 Understand the important concepts of good water supply system to a city/town or a village. To understand the need of conservation of rain water and its applications. To understand the sources, effects, prevention and control measures of water pollution and its legislative aspects. 							

Course Outcomes	Course Outcome Statement	PO's / PSO's				
CO1	Relate the relations between the environment and ecology, estimating water requirements for public water supply schemes.	PO1, PO6, PO7, PO9,PO10,PO12,/ PSO1				
CO2	Study and Establish the suitable distribution system for a locality and know the appurtenances used.	PO1,PO6, PO10,PO12/ PSO2				
CO3	Identify and summarize the arrangement of water supply and fittings in a building.	PO1, PO5, PO6, PO10,PO12/ PSO2				
CO4	Determine the need for conservation of water and rural water supply.	PO1,PO2,PO5 ,PO9, PO12/ PSO1, PSO2				
CO5	Knowledge on water treatment	PO1,PO2,PO5 ,PO9, PO12/ PSO1, PSO2				
TOTAL HOURS OF INSTRUCTIONS: 45						

Module No. 1	Sources Of Water	9 Hours

Public water supply system — Planning, Objectives, Design period, Population forecasting; Water demand — Sources of water and their characteristics, Surface and Groundwater — Impounding Reservoir — Development and selection of source — Source Water quality — Characterization — Significance — Drinking Water quality standards.

Module No. 2 Conveyance From The Source		9 Hours					
Water supply — intake structures — Functions; Pipes and conduits for water — Pipe materials — Hydraulics of							
tlow in pipes — Transmission main design — Laying, jointing and testing of pipes — appurtenances — Types and capacity of pumps — Selection of pumps and pipe materials							

Module No. 3	Water Treatment	9 Hours	
Unit operations and processes — Principles, functions, and design of water treatment plant units, aerators of flash			
mixers, Coagulation and flocculation –Clarifloccuator-Plate and tube settlers — Pulsator clarifier — sand filters —			
Disinfection — Residue Management – Construction, Operation and Maintenance aspects.			
Modulo No. 4	Water Distribution And Supply	0 Hours	

Module No. 4	Water Distribution And Supply	9 Hours
Requirements of water distribution — Components — Selection of pipe material — Service reservoirs — Functions — Network design — Economics — Analysis of distribution networks -Computer applications — Appurtenances — Leak detection. Principles of design of water supply in buildings — House service connection — Fixtures and fittings, systems of plumbing and types of plumbing.

Module No. 5	Advanced Water Treatment	9 Hours
Water softening -	Desalination- R.O. Plant — demineralization — Adsorption — Ion excl	hange-

Membrane Systems — RO Reject Management — Iron and Manganese removal — De-fluoridation — Construction and Operation & Maintenance aspects — Recent advances — MBR process

Text Books

- 1. Water Supply and Sanitary Engineering by G.S. Birdie & J.S. Birdie (Reprint 2021)
- 2. Water Supply Engineering by Dr. Ravikant Pagnis & J.S. Kadagaonkar (2021)
- 3. BC. Punmia, Ashok Kuamr Jain and Arun Kumar Jain, "Water Supply Engineering", Laxmi Publications (P) Ltd., New Delhi, 2012.

References

- 1. P.N. Modi, "Water Supply engineering", Standard Book House, Delhi, 1998
- 2. Water Supply and Sanitary Engineering by Rangwala (2021 Edition)

Course Type	Theory (TH)		
Mode of Evaluation	Theory Examination-1 Examination-2 Assignment/ Quiz	15 15 20	100%
	Final Assessment Test	50	
Prepared by	Mr. Syed Mohd. Arif		
Recommended by the Board of Studies on			
Date of Approval by the Academic Council	and the second second		

PO/PS O	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PSO 1	PSO 2
C01	3	0	0	0	0	1	1	0	1	1	0	1	1	0
CO2	2	0	0	0	0	1	0	0	0	1	0	1	0	1
C03	3	0	0	0	1	1	0	0	0	1	0	1	0	1
C04	2	1	0	0	1	0	0	0	1	0	0	1	1	1
C05	2	1	0	0	1	0	0	0	1	0	0	1	1	1

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Department of Civil Engineering Chandigarh Engineering College, Jhanjeri Mohali, Punjab 140307

Course Code: CE307	Course Title Traffic Engineering	ТРС	3	0	3	
Version No.	1.0					
Course Pre-requisites/ Co- requisites	CE-306					
Anti-requisites (if any)	None					
Objectives:	 To have an overall knowledge of the traffic contraffic characteristics and related problems. To develop a strong knowledge base of management in any transportation area. To provide knowledge of traffic control devised transportation interaction. 	ompone traffic ces and	ents pla l its	and nni teo	l assess the ng and its chniques in	

Course Outcomes	Course Outcome Statement	PO's / PSO's
CO1	Determine the traffic flow parameters for traffic	PO1, PO2, PO5, PO6, PO9, PO12/
COI	management.	PSO1
CO2	Predict the future traffic demand for the urban and	PO1,PO5,PO6,PO9,PO10,PO12/PS
02	rural area.	O2
CO3	Plan the parking plots as per the traffic availability	PO1, PO2, PO4, PO9,PO12/ PSO2
003	in the urban area.	
CO4	Design of Traffic system Management	PO1, PO2, PO5, PO9,PO12/ PSO2
CO5	Design the various types of intersection in the	PO1, PO2, PO5, PO9,PO12/ PSO2
05	urban area.	
	TOTAL HOURS OF INSTRUCTI	ONS: 45

Fundamental of traffic flow Module No. 1 9 Hours Basic components of traffic flow, road user, vehicle, environment and their characteristics, speed -volume -density

relationship, homogenous and heterogonous traffic flow, PCU concept, vehicle operating cost.

Module No. 2	Transportation surveys & Highway Capacity	9 Hours
O-Surveys, spot-speed	survey (using enoscope and radar speedometer) traffic volume count	s, travel time, parking
survey, interaction volu	me count and delay surveys, methods analysis and interpretation.	
Importance of 'Capacity	y' in Highway transportation studies, Capacity of uninterrupted flow	conditions as per Indo-
HCM, PCU in reference	e to Indo-HCM in urban and rural area, Determination of theoretical	capacity, Level of
service, Factors affectin	g capacity and level of service.	

Module No. 3	Traffic Accidents – Causes and prevention	9 Hours
Accident situation in In	dia, Collection of accident data, Statistical methods for analysis of a	ccident data, Road and
it's effect on accidents,	Skidding, Speed in relation of safety, Traffic management measures	and their influence on
accident prevention, Co	ndition and collision diagram and its utility, Legislation, Enforcement	nt, Education and
Propaganda.		

Module No. 4	Parking studies and Traffic system management	9 Hours				
Traffic and parking problems, Ill effects of parking, Zoning and parking space requirement standards, Design						
standards for on street	parking, Off street parking facilities, Peripheral parking system. Intr	oduction, Travel demand				
management, Traffic r	nanagement measures, Restrictions to turning movements - one	way streets - tidal flow				
operations-Traffic segr	egation -Traffic calming- Exclusive bus lanes, conflict point diag	ram for various types of				
streets, Introduction to I	TS in traffic management.					

Module No. 5 De	sign of Intersection		0.11					
Design of at grade & grad	le separated intersection - reter		9 Hours					
signals, Advantages and disadvantages. Types of signals, Matheda of activity intersection - Tra								
Coordinated control of sign	Coordinated control of signals. Necessity of signal aparticution in the signal timings, Warrants for signal							
	said, receasily of signal cooldin	lation, Types of coordinated sign	ial system.					
Text Books								
1. Kadiyali, L.R., Tra	affic Engineering and Transport	Planning Khanna Pattishara M	m Dull 2021					
2. Traffic Engineerin	g Handbook, 7th Edition (2020)	Publisher: Institute of Transport	ew Delni, 2024.					
References	5 June 2019 - 111 Bunton (2020)	, rubhaner. mstitute of franspo	rtation Engineers (TTE).					
1Bindra S.P., A cou	rse in Highway Engineering D	happat Dai Bublications						
2. Dr. Sharma S K	Principles Prestice and Deci	hanpat Kai Publications						
& Company I td	Therpies, Practice and Design	of Highway Engineering (Inclu	ding Airports), S. Chand					
3 Khanna S.K. Justo	CEC ULL ELL							
5. Klanna S.K., Justo	C.E.G., Highway Engineering,	Nem Chand & Bros., Roorkee.						
Course Type	Theory (TH)							
	Theory	er	100%					
	Examination-1	15						
Mode of Evaluation	Examination-2	15						
	Assignment/ Quiz	20						
D 11	Final Assessment Test	50						
Prepared by	Ms. Swati Pathak							
Recommended by the								
Board of Studies on								
Date of Approval by								
the Academic Council	2010 Contraction Contraction							

PO/PS O CO	PO 1	PO 2	РО 3	РО 4	РО 5	PO 6	РО 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PSO 1	PSO 2
C01	2	1	0	0	1	1	0	0	1	0	0	1	1	0
CO2	2	0	0	0	1	1	0	0	1	1	0	1	0	1
CO3	2	1	0	1	1	0	0	0	1	0	0	1	0	1
CO4	2	1	0	0	1	0	0	0	1	0	0	1	0	1
CO5	2	1	0	0	1	0	0	0	1	0	0	1	0	2.
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Head Department of Civil Engineering Chandigarh Engineering College, Jhanjeri Mohali, Punjab 140307

Course Code: CI	Course Title Soil Mechanics		ТРС	3	2	4		
Version No. 1.0								
Course Pre-requisites/ Co- requisites None								
Anti-requisites (i	f any)	None						
Objectives:		 To impart the fundamental concepts of soil mechanics and understand the bearing capacity To understand the concept of compaction and consolidation of soils. To understand the design aspects of foundation To evaluate the stress developed in the soil medium & the stability of slopes 						
		CO-PO Mapping						
Course Outcomes	Co	urse Outcome Statement	РО	's / PS	O's			
CO1	Comprehend challenges a index and er (apply) the so	the various geotechnical field nd understand their fundamental, agineering properties and then use bil as an engineering material.	PO1, PO2, PO	3, PO6	, PS	02		
CO2	To understand	inderstand the concepts of soil hydraulics PO1, PO3, PO6, PO7, PO12						
CO3	To familiarize soil	the concepts of stress analysis in the	PO1, PO2, PO2	D3, PO6,PSO1				
CO4	Design the estability of fin	embankment slopes and check the ite slopes.	PO1, PO5, PO	6, PO1	2,PS	502	2	
C05	To understand Design & chec	I the shear strength characteristics & ck the stability of slopes	PO1, PO2, PO3	3, PO7	,PO	12,	PSO2	
		TOTAL HOURS OF INSTRUCTION	ONS: 45					
Modulo No. 1	Basic Co	naants & Inday Proparties		12	Uor	MG		
Definition of soil	Comparison be	etween soil mechanics, rock mechanics	and geotechnica	l engi	neeri	in s	Scope of soil	
Definition of soil, Comparison between soil mechanics, rock mechanics and geotechnical engineering, Scope of soil mechanics problems in Civil Engineering. Principal types of soils in India. Characteristics of main Clay mineral groups. Soil as three phase system: weight volume relationship and determination of moisture content from nuclear method, alcohol method and sensors. Determination of Specific gravity by pycnometer method. Field density from sand replacement method. Grain size analysis. Stokes's law. Consistency and sensitivity of Clay, Atterberg Limits, Flow Index and Toughness Index. Underlying theory of shrinkage limit determination. Classification of coarse and fina grained soils as nor Indian Standard								
Module No. 2Permeability of Soil7 Hours								
Darcy's law, valid head method, fal permeability of so graphical method to	ity of Darcy's ling-head meth il. Seepage An o plot flow nets	law. Determination of coefficient of phod. Permeability aspects: permeability aspects permeability aspects.	permeability: La ility of stratific itial functions, c	borato ed soi haracto	ry n ls, t erist	net fac ics	hod: constant- tors affecting of flow nets,	
Module No. 3	Effective	Stress Principle		5 E	lour	·s		
Introduction, effec stress, effective stre	tive stress prin	ciple, nature of effective stress, effective stress, effective by capillary action, seepage press	ct of water table ure, quick sand o	e. Fluc conditi	tuat on.	ior	s of effective	
Module No. 4	Compact	ion & Consolidation of Soil	-	12	Hou	irs		

Introduction, theory of compaction, laboratory determination of optimum moisture content and maximum dry density. Compaction in field, compaction specifications and field control. Introduction, comparison between compaction and consolidation, initial, primary & secondary consolidation, spring analogy for primary consolidation, interpretation of consolidation test results, Terzaghi's theory of consolidation, Concept of various consolidation characteristics i.e. a_v , m_v and c_v , primary and secondary consolidation concept of c_v , t_v & U. Consolidation test: determination of c_v from curve fitting methods, Pre consolidation pressure determination. Normally consolidated and over consolidated clays. Causes of overconsolidation. Effect disturbance on e-Log σ curves of normally consolidated clays, importance of consolidation settlement in the design of structures. Final settlement of soil deposits, computation of consolidation settlement and secondary consolidation.

Module No. 5	Shear Strength & Stability of Slopes	8 Hours
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Mohr circle and its characteristics, principal planes, relation between major and minor principal stresses, Mohr-Coulomb theory, types of shear tests: direct shear test, merits of direct shear test, triaxial compression tests, test behaviour of UU, CU and CD tests, computation of effective shear strength parameters. unconfined compression test, vane shear test, Introduction, types of slopes and their failure mechanisms, factor of safety, analysis of finite and infinite slopes, wedge failure Swedish circle method, friction circle method, stability numbers and charts

Text Books

- 1. Soil Mech. & Foundation Engg, by K.R.Arora Standard Publishers Distributors,7th edition, Reprint 2022.
- 2. Soil Mechanics and Foundation Engineering, Murthy V.N.S CBS publications, New Delhi, 2020.
- **3.** Basic and applied Soil Mechanics by Gopal Ranjan and A.S. R. Rao New Age International Publishers,5th edition,2023

References

- 1. Fundamentals of Soil Engineering by Taylor, John Wiley & Sons.
- 2. .Geotechnical Engineering, by P. Purshotama Raj Tata Mcgraw Hill.
- 3. Geotechnical Engineering by Gulati and Datta, Tata McGraw Hill.

Lab Exercise

- 1. Determination of in-situ density by core cutter method.
- 2. Determination of in-situ density by Sand replacement method.
- 3. Determination of Liquid Limit
- 4. Determination of Plastic Limit.
- 5. Determination of specific gravity of soil solids by pyconometer method.
- 6. Grain size analysis of sand and determination of uniformity coefficient (Cu) and coefficient of curvature (Cc).
- 7. Standard Proctor Compaction test.
- 8. Modified Proctor Compaction test.
- 9. Determination of Relative Density of soil.
- 10. Determination of permeability by Constant Head Method.
- 11. Determination of permeability by Variable Head method.
- 12. Unconfined Compression Test for fine grained soil.
- 13. Direct Shear Test
- 14. Triaxial Test
- 15. Swell Pressure Test

Text Books

1. Soil Testing Engineering, Manual By Shamsher Prakash and P.K. Jain. Nem Chand & Brothers

Reference Books

1. Braja M.Das., "Soil Mechanics: Laboratory Manual", Oxford University Press, eighth edition, 2012

Course TypeEmbedded Theory and Lab (ETL)

	Theory		75%
	Examination-1	15	
	Examination-2	15	
Mode of Evaluation	Assignment/ Quiz	20	
	Final Assessment Test Laboratory	50	25%
Prepared by	Mr. Vineet Pandey		
Recommended by the			
Board of Studies on			
Date of Approval by			
the Academic Council			

PO/PSO	PO	РО	РО	РО	РО	PO	PO	POS	PO9	PO10	PO11	PO1	PSO1	PSO
СО	1	2	3	4	5	6	7	100	107	1010		2		2
C01	1	1	1		1,00	2	14.	- sàc	1.15					1
CO2	1		2			1	2		1922	and a start	45.00	1	16.	
C03	2	1	2			1	1	4.586	Sec.		1		1	
C04	1			1.00	1	2	19:51	Start St	13.318			1		1
C05	2	2	2			12:22	1			T.M.	97.0	1		1

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Head Department of Civil Engineering Chandigarh Engineering College, Jhanjeri Mohali, Punjab 140307

Course Code: CE303	Course Title Design of Reinforced Concrete Structures TPC 4				
Version No.	1.0	i			
Course Pre-requisites/ Co- requisites	CE203				
Anti-requisites (if any)	None				
Objectives:	 To understand the various components of a generic building system To choose the right dimensions for various building components To learn initial surveying for the excavation and construction Use various code provisions for correct construction practices 				

Course Outcomes	Course Outcome Statement	PO's / PSO's				
CO1	Understand various design components of a generic building system	PO1, PO2, PO3, PO5/ PSO1, PSO2				
CO2	Understanding of Design of Continuum slab systems	PO1, PO2, PO3, PO5/ PSO1, PSO2				
CO3	Understanding design of Flexural members	PO1, PO2, PO3, PO5/ PSO1, PSO2				
CO4	Use various code provisions for design of compression members	PO1, PO2, PO3, PO5/ PSO1, PSO2				
CO5	Understanding design of Foundation systems	PO1, PO2, PO3, PO5/ PSO1, PSO2				
TOTAL HOURS OF INSTRUCTIONS: 60						

Module No. 1	Design Philosophies	12 Hours		
Design philosophies	of R.C structures (WSM, LSM), Structural elements, loads on	structures, and structural		
properties of concrete	e, Role of structural engineer. R.C. sections in flexure: theory an	d design, singly, doubly		
reinforced rectangular	and flanged sections.			

Module No. 2One way and Two Way Slab and Staircase12 HoursOne-way slab - simply supported, cantilever and continuous. Two way slab- simply supported, continuous and
restrained. Design of staircase: Dog legged and open well12 Hours

Module No. 3	Design of Beams	12 Hours
Design of beams for fle	xure, shear, bond and torsion: Simply supported, continuous, cantile	ever

 Module No. 4
 Design of Column

 Column axially loaded short and long uni-axial

Column, axially loaded, short and long, uni-axial and biaxial moments.

Module No. 5Foundation Design12 HoursIsolated column footing, axial load, uni-axial and biaxial moments. Eccentric footing, Footing in difficult soil
conditions.Footing in difficult soil

12 Hours

Text Books

1. Dr. V.L Shah Dr. S.R Karve, "Advanced Design Of Reinforced Concrete Structures", Standard Publishers (2024)

2. S Unnikrishna Pillai , Devdas Menon "Reinforced Concrete Design" (2022)

References

- 1. Subramanian, N. "Reinforced Concrete Structures." Oxford University Press (2013)
- Varghese P.C., "Limit State Design of Reinforced Concrete", Prentice Hall of India, New Delhi,
- 3. Dayaratnram P., "Limit State Analysis and Design", Wheeler Publishing company, Delhi.
- 4. Sinha, "RCC Analysis and Design", Vol. II and I, S. Chand and Co., New Delhi
- 5. Jain A. K., "Reinforced Concrete Design (Limit State)", NEM CHAND AND BROS, 2012

Course Type	Theory (TH)					
Mode of Evaluation	Theory Examination-1 Examination-2 Assignment/ Quiz	15 15 20		100%		
Prepared by	Dr. Anshu Tomar	50				
Recommended by the Board of Studies on Date of Approval by the Academic Council						

PO/PSO								-						
со	P01	PO2	PO3	P04	PO5	PO6	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	2	-	1		-							1302
CO2	3	7			-	-				-	-	-	2	2
602	-	-	- 4		1	-	-	-	-	-	-	-	2	2
- 03	3	2	2	-	1	-	-	-	-	-	-	-	7	
CO4	3	2	2	-	1	-	-	-	-	_			-	2
CO5	3	2	2		-	-	-				-	-	2	2
		_	-	-	1	-	-	-	•	•	-	-	2	2

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Head Department of Civil Engineering Chandigarh Engineering College, Jhanjeri Mohali, Punjab 140307

Course Code: CE304	Course Title Design of Steel StructuresTPC404				
Version No.	1.0				
Course Pre-requisites/ Co- requisites	CE203				
Anti-requisites (if any)	None				
Objectives:	 The objectives of this course is to : Study the behavior and design of structural steel connections. Acquire the knowledge on fundamentals of limit state design of structural steel members subjected to compressive, tensile and bending loads. Design the cold formed steel structures. 				

CO-PO Mapping						
Course Outcomes	Course Outcome Statement	PO's / PSO's				
CO1	Design the Connections.	PO1, PO2, PO3, PO5/ PSO1, PSO2				
CO2	Design the tension members, compression members and flexural members.	PO1, PO2, PO3, PO5/ PSO1, PSO2				
CO3	Design of Flexural Members	PO1, PO2, PO3, PO5/ PSO1, PSO2				
CO4	Design the Plate Girders and Beam-Columns.	PO1, PO2, PO3, PO5/ PSO1, PSO2				
CO5	Design the Cold Formed Steel Structures.	PO1, PO2, PO3, PO5/ PSO1, PSO2				
	TOTAL HOURS OF INSTRUC	TIONS: 60				

Module: 1	Introduction to Steel Structures	13 hours			
Materials: Types of structural steel, mechanical properties, concepts of plasticity, yield strength.; Loads and Stresses: Local buckling behavior of steel; Design Concepts: Limit state design, load combinations, deflection limits, serviceability, and stability checks; Connections: Types of connections, bolted and welded connections, design strength, efficiency of joints, prying action, beam-column connections, eccentric connections, framed connections					
Module: 2	Design of Tension Members and Compression Member	14 hours			
Tension members–Types of tension members and sections-Modes of failure-Net area–Design of tension members–Lug angles–Design of tension splice-Tension rods. Buckling classification-Effective length of compression member-Single angle struts-Design of compression					
Module: 3	Design of Flexural Members	11 hours			
Classification of cross laterally unsupported	sections-Web buckling-Web crippling-Design of laterally supported beams.	beams-Design of			
Module: 4	Industrial Structures	12 hours			
Gantry Girders: Design of gantry girders, wheel loads, impact factor, design of end carriages; Industrial Frames: Analysis and design of industrial frames, bracing systems, stability considerations.					
Module: 5	Plastic Analysis and Design	10 hours			
Plastic Theory: Introduction to plastic analysis, plastic hinge, mechanism method, Design Applications: Design of continuous beams and portal frames using plastic design approach.					

Text Books

- 1. J. P. Den Hartog, Introduction to the Design of Steel Structures, 2021, Dover Publications.
- 2. M. R. S. M. Rao, Design of Steel Structures, 2021, PHI Learning Pvt. Ltd.
- 3. P. Dayaratnam, Design of Steel Structures, 2021, Standard Publishers Distributors.

References

- 1. Duggal S. K., Limit State Design of Steel Structures, 2019, McGraw Hill Education India Pvt. Ltd.
- 2. R. Narayanan and D. Sundararajan, Design of Steel Structures, 2020, Wiley India.
- IS 800:2007, Indian Standard Code of Practice for General Construction in Steel, Bureau of Indian Standards, New Delhi.

Course Type	Theory (TH)		
	Theory Examination-1 Examination-2	15 15	100%
Mode of Evaluation	Assignment/ Quiz	20	
Prepared by	Mr. Sourabh Dhiman	50	
Recommended by the Board of Studies on			
Date of Approval by the Academic Council			

PO/PS O CO	PO 1	PO 2	PO 3	PO 4	PO 5	РО 6	РО 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PSO 1	PSO 2
C01	3	2	2	-	1	24	<u>े व</u> ि	-		-	· · · <u>-</u> · · ·	-	2	2
CO2	3	2	2	-	1	-	-	-	-		-	-	2	2
CO3	3	2	2	-	1		-	-	-	-	-	-	2	2
CO4	3	2	2	-	1		1 - 1	-	-	x- ;	-	-	2	2
CO5	3	2	2	-	1		-	-		-	-	-	2	2

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Department of Civil Engineering Chandigarh Engineering College, Jhanjeri Mohali, Punjab 140307

Course Code: CE305	Course Title Foundation EngineeringTPC303					
Version No.	1.0					
Course Pre-requisites/ Co- requisites	None					
Anti-requisites (if any)	None					
Objectives:	 To understand the various properties of soil and detailing of soil exploration. Summarize the design and detailing about retaining wall and earth pressure theory. To understand and classify the various types and details of shallow foundation. Analyze the various procedures and methods related to pile foundation along with negative skin friction 					

Course Outcomes	Course Outcome Statement	PO's / PSO's					
CO1	Understand the methods of surface and subsoil exploration and to prepare investigation report.	PO1, PO2, PO3, PO6/ PSO2					
CO2	Estimate the stresses in soils and bearing capacity of soil for shallow foundation.	PO1, PO2, PO3, PO4, PSO1					
CO3	Design various types of shallow foundation and to estimate settlement.	PO1, PO3, PO6, PO7,PO12					
CO4	Apply the concepts of deep foundation and solve problems related with pile foundation	PO1, PO2, PO3, PO6, PSO1					
CO5	To understand the concept of well foundation	PO1, PO2,PO12,PSO2					
	TOTAL HOURS OF INSTRUCTIONS: 45						

Module No. 1Soil Exploration

8 Hours

Objectives of soil investigation for new and existing structures. Depth of exploration for different structures. Spacing of bore Holes. Methods of soil exploration and relative merits and demerits. Types of soil sample. Essential features and application of the following types of samples Open Drive samples, Stationery piston sampler, Rotary sampler, standard penetration test - static and dynamic cone penetration test ,Bore Hole log for S.P.T. Geophysical exploration by seismic and resistivity methods

Module No. 2	Earth Pressure	6 Hours					
Bosussinesq equation for a point load, uniformly loaded circular and rectangular area, Newmark's chart and its							
construction. 2:1 me	construction. 2:1 method of load distribution. Comparison of Bosussinesq and Westerguard analysis for a point						
load. Pressure Bulb and Isobar. Related Numerical Problems							
Module No. 3	Shallow Foundation	11 Hours					

Terms and symbols used for a retaining wall. Movement of all and the lateral earth pressure. Earth pressure at rest. Rankine states of plastic equilibrium, Ka and Kp for horizontal backfills. Rankine's theory both for active and passive earth pressure for Cohesionless backfill with surcharge and fully submerged case. Cohesive backfill condition. Coulomb method for cohesion less backfill. Merits and demerits of Ranking and Coulomb theories, Culmann's graphical construction.

|--|

Types and function of pile - factors influencing the selection of pile carrying capacity of single pile in cohesion less and cohesive soil by static formula. Determination of point resistance and frictional resistance of a single pile by Static formulas. Piles in Clay, Safe load on a Friction and point Bearing pile- dynamic formulae (Engineering News and Hileys) Types of pile driving hammers & their comparison.Limitations of pile driving formulae. Negative skin friction, Pile in sand, Spacing of piles in a group, Factors affecting capacity of a pile group. Efficiency of pile group by converse – Labare formula and feeds formulas. Calculation of settlement of friction pile group in clay. Settlement of pile groups in sand. Negative skin friction, Related Numerical problems

Broup in ciay. Se	thement of prie groups in sand, Nega	live skin friction. Related Num	ierical problems
Module No. 5	Well foundations		6 Hours
Shapes, depth of	well foundations, components, fact	tors affecting well foundation	n design, Scour Depth,
construction procedu	ure, sinking of wells, rectification of	tilts and shifts, recommended	values of tilts & shifts as
per I.S.3955.			
Text Books			
1. Soil Mech. 2022.	& Foundation Engg, by K.R.Arora	a Standard Publishers Distrib	utors,7th edition, Reprint
2. Basic and	applied Soil Mechanics by Gopa	I Ranjan and A.S. R. Rao	New Age International
Publishers,5	ith edition,2023		
Soil Mechar	nics and Foundation Engineering, Mu	rthy V.N.S - CBS publications.	, New Delhi, 2020.
References			
 Fundamenta 	als of Soil Engineering by Taylor, Joh	n Wiley & Sons.	
2Geotechnic	al Engineering, by P. Purshotama Raj	Tata Mcgraw Hill.	
3. Geotechnica	al Engineering by Gulati and Datta, Ta	ata McGraw Hill.	
Course Type	Theory (TH)		
a sector data	Theory		100%
	Examination-1	15	
	Examination-2	15	
Mode of Evaluation	n Assignment/ Quiz	20	
	And The State of the second		
	Final Assessment Test	50	
Prepared by	Mr. Vineet Pandey		

Recommended by the Board of Studies on	
Date of Approval by the Academic Council	

PO/PSO	PO	PO	PO	PO	PO	РО	PO	POS	P09	PO10	PO11	PO1	PSO1	PSC
CO	1	2	3	4	5	6	7	100		1010		2		2
C01	1	1	1			2								1
CO2	2	1	2	1		-	5.5						1	
CO3	1		2			1	2	Sam.				1		•
CO4	2	1	2	Type I	1.185	1			Sec. 1				1	
C05	2	2		14.50		ann an	Sec. 1	-Painter	Section .			1		1

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Department of Civil Engineering Chandigarh Engineering College, Jhanjeri Mohali, Punjab 140307

Program Elective -4

Course Code: CE205	Course Title Advanced Structural Analysis	ТРС	3	0	3		
Version No.	1.0						
Course Pre-requisites/ Co- requisites	CE204						
Anti-requisites (if any)	Structural Analysis						
Objectives:	 To learn advanced methods of structural analysis and to apply these m for analysis of indeterminate structures. To impart preliminary knowledge of analyzing structures using finite element methods. 				nese methods finite		

CO-PO Mapping								
Course Outcomes	Course Outcome Statement	PO's / PSO's						
CO1	To understand the basic concept of structural Analysis.	PO1, PO4, PO7/ PSO1, PSO2						
CO2	With the knowledge of this subject students shall be able to analyze the complex structures using advanced methods of analysis.	PO1, PO4/ PSO1, PSO2						
CO3	Students shall be able to analyze the complex structures by Flexibility Matrix Method	PO1, PO3, PO12/ PSO1, PSO2						
CO4	Students shall be able to analyze the complex structures by Finite Element Method	PO1, PO3, PO4, PO7/ PSO1, PSO2						
CO5	Students able to understand the matrix method	PO1, PO3, PO12/ PSO1, PSO2						
	TOTAL HOURS OF INSTRUCTIONS: 45							

Module No. 1Basic concepts in structural analysis5 HoursStructure (structural elements, joints and supports, stability, rigidity and static indeterminacy, loads (direct actions, indirect loading), response (equilibrium, compatibility, force-displacement relations).5 Hours

Module No. 2Stiffness Matrix Method12 HoursBasis of stiffness method, Influence coefficients, Kinematic indeterminacy, Degree of freedom, Action
displacement relationship, Matrix approach to stiffness method, Transformation of axes system, Formation
of load vectors, Elastic supports, Support displacements, Application of stiffness matrix method to various
type of structures e.g. Continuous beams, Trusses, Frames and grids, partially discontinuous structures,
Temperature effects.

Module No. 3	Flexibility Matrix Method11 Hours							
Compatibility equations, Flexibility coefficients, Application of complementary energy principles, Basis of the								
method, Application of	method, Application of flexibility matrix method to various types of structures, Analysis of pin jointed trusses, Rigid							
frames.								
Module No. 4	Finite Element Method	10 Hours						

Introduction to finite element method, Theory of elasticity, Coordinate systems, Rotation of axes, Shapefunctions, Elements stiffness matrix and load vector, Triangular element in plane stress and strain,Numerical integration, Isoparametric elements, Rectangular elements in flexure, Triangular element,Rectangular element in plane stress and bending combined.Module No. 5Matrix Methods of Structural Analysis7 Hours

Stiffness and flexibility matrices for elements and structures, Analysis of continuous beams, simple rigid-jointed frames, and plane trusses using stiffness and flexibility methods.

Text Books

- 1. R.C. Hibbeler, Structural Analysis, 2022, Tenth Edition (SI Units), Pearson Education.
- 2. Devdns Menon, Advanced Structural Analysis, 2021, Second Edition, Narosa Publishing House.
- 3. Ashok K. Jain, Advanced Structural Analysis, 2023, Fourth Edition, Nem Chand & Bros.

References

- 1. Igor A. Karnovsky and Olga Lebed, Advanced Methods of Structural Analysis, 2021, Springer.
- Srinivasan Chandrasekaran, Advanced Structural Analysis with MATLAB®, 2021, First Edition, CRC Press.

Course Type	Theory (TH)		
Mode of Evaluation	Theory Examination-1 Examination-2 Assignment/ Quiz	15 15 20	100%
Prepared by	Mr. Sourabh Dhiman		
Recommended by the Board of Studies on			
Date of Approval by the Academic Council			

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PO/PSO CO	P01	PO2	PO3	P04	PO5	P06	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3			2			2	-		-	-	-	2	2
CO2	3	-		3	-						•	-	2	2
CO3	3		2				-	-			-	1	2	2
CO4	3		-	2	2	-	2		-	-		-	2	2
COS	3			2	2	-	2					-	2	2

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Department of Civil Engineering Chandigarh Engineering College, Jhanjeri Mohali, Punjab 140307

Course Code: CE216	Course Title Hydraulic Structures And Hydro Power Engineering	Т	FPC	3	0	3
Version No.	1.0				-	-
Course Pre-requisites/ Co- requisites	CE202					
Anti-requisites (if any)	None					
Objectives:	 Design of gravity dam. Do the stability analysis of concrete gravit Design of modern weirs and barrages. 	y dams.	.			

Course Outcomes	Course Outcome Statement	PO's / PSO's
CO1	To prepare the students for a successful career as hydrologist and water resources engineers	PO1, PO2,PO4/ PSO1
CO2	Ability to know about design principles of various types of hydraulic structures.	PO1, PO2,PO4/ PSO1
CO3	Ability to perform stability analysis of concrete gravity dams.	PO1, PO2, PO3, PO4, PO12/ PSO1
CO4	Ability to Design considerations and fixing the section of a dam.	PO1, PO2, PO3, PO4, PO12/ PSO1
CO5	Understanding of Canal structures	PO1, PO2, PO3, PO4, PO12/ PSO1
	TOTAL HOURS OF INSTRUCTION	ONS: 45

Module No. 1Introduction to Hydraulic Structures7Failure of hydraulic structures founded on previous foundation, Bligh's creep theory , Lanes weighted creep theory,
Khoslas theory and concept of flow nets, Design of vertical drop weir on Bligh's theory.7

5										
Module No. 2	Theories of hydraulic structures	11								
Design of modern weirs and barrages founded on permeable foundations on the basis of Khosl's theory. Data										
pertaining to certain ir	pertaining to certain important barrages of India, Selection of the type of dam and their classification, Factors									
governing the selection	of a particular type of dam ,Selection of dam site, Storage zones of	of a reservoir, Rule curves								
and operating tables for	and operating tables for reservoirs.									
Module No. 3	Design of gravity dam	11								

Design of gravity dam: definition, typical cross section, Forces acting on gravity dam. Modes of failure and criteria for structural stability of gravity dams, Gravity method or two dimensional stability analysis, Elementary profile of gravity dam, High and low gravity dam, Profile of a dam from practical consideration, Design considerations and fixing the section of a dam.

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Module No. 4Construction of gravity dam

Diversion problem in dam construction, Construction of galleries in gravity dam, cracking of concrete in concrete gravity dam, Joints in gravity dam, Foundation treatment for gravity dams

Module No. 5Canal Structures

Canal Types and Design, Canal Regulators and escapes, Canal headworks: selection of site, components like weirs, barrages, divide walls, scouring sluices, fish ladders.

Text Books

1. B.C. Punmia, Irrigation and Water Power Engineering, 2022, Laxmi Publications.

- 2. VJ.S. Snini, Design of Hydraulic Structures, 2022, Wiley.
- 3. R.S. Varshney, Hydraulic Structures, 2022, Oxford & IBH Publishing Co.

References

- 1. K.N. Duggal, Hydraulic Structures, 2021, S. Chand Publishing.
- 2. D.C. Soni and A.S. Gupta, Hydropower Engineering, 2021, Dhanpat Rai & Co.
- 3. Creager, Justin, and Hinds, Engineering for Dams, 2021, Wiley.

Course Type	Theory (TH)				
Mode of Evaluation	Theory Examination-1 Examination-2 Assignment/ Quiz Final Assessment Test	15 15 20 50	ŝ,		100%
Prepared by	Mr. Sourabh Dhiman				
Recommended by the Board of Studies on					
Date of Approval by the Academic Council				2	

PO/PSO	POI	PO2	PO3	804	DOF	000	007	000						
со	101	102	103	P04	PUS	P06	101	P08	109	P010	P011	P012	PSO1	PSOZ
C01	2	1	•	1	. •.0.	-	•	-	-	-	-		1	
CO2	2	1	- 9	2		-		-			-		1	
CO3	2	2	3	2	- 1	-	-	-	-	N- 8.		1	1	
CO4	2	2	3	2		-	-	-	-	-	-	1	1	
COS	2	2	3	2			-	-	-	-	-	1	1	

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Department of Civil Engineering Chandigarh Engineering College, Jhanjeri Mohali, Punjab 140307

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Course Code: CE220	Course Title Port and Harbor Engineering	TPC 3 0 3
Version No.	1.0	· · · · · ·
Course Pre-requisites/ Co- requisites	None	
Anti-requisites (if any)	None	
Objectives:	 Aimed to provide the clear understanding of the P components. Aimed to provide safe, timely and economic trans goods is necessary for social and economical devenation. Understand key issues in coastal planning like pop demographic change, infrastructure demand and c 	ort and Harbor portation of passengers and elopment of any region or pulation growth, elimate change.

Course Outcomes	Course Outcome Statement	PO's / PSO's						
CO1	Understand important planning concepts of harbor	PO1, PO6, PO7, PO9,PO10,PO12,/						
001	and ports	PSO1						
CO2	Know important functional components of harbor	PO1,PO5,PO6,PO7,PO9,PO10,PO1						
02	and ports	2/ PSO1						
CO3	Understand important design concepts of harbor	PO1,PO2,PO3,PO5,PO6,PO7,PO9,P						
005	and ports components	O10,PO12/ PSO1, PSO2						
CO4	Design, plan and integrate port and harbor	PO1,PO2,PO3,PO5,PO6,PO7,PO9,P						
C04	infrastructure.	O10,PO12/ PSO1, PSO2						
C05	Understanding Planning and construction	PO1,PO2,PO3,PO5,PO6,PO7,PO9,P						
005	Understanding Planning and construction	O10,PO12/ PSO1, PSO2						
	TOTAL HOURS OF INSTRUCTIONS: 45							

Module No. 1Introduction to Water Transportation

9 Hours

History, Scope, Merits, Developments of Water Transportation in India, Inland waterways, River, Canal, Inland water transportation, Harbor, Port, Dock, Development of Ports & Harbors, classification, Harbor site selection, Harbor dimensioning.

Module No. 2	Port Planning	9 Hours								
Characteristics of good seaport and principles of seaport planning, size of seaport, site selection criteria and layout of										
seaport, Dry ports, Bull	c cargo, Transshipment ports, Port of call, Surveys to be carried out t	for seaport planning,								
regional and intercontir	nental transportation development, forecasting cargo & passenger de	mand, regional								
connectivity, cargo han	connectivity, cargo handling capacity of port.									

Module No. 3	Natural Phenomena	9 Hours
Wind, Tides, Water wa sediment transport, Effe	ves, Wind rose and wave rose diagrams, wave diffraction, breaking, ects on Harbor and structure design.	reflection, Littoral drift,
Module No. 4	Harbor Infrastructures	9 Hours

Ship characteristics. Design of Harbor entrance, channel, turning basin, IS provisions, Breakwaters - function, types, general design principles, wharves, quays, jetties, piers, pier heads, dolphin, fenders, mooring accessories, IS provisions. Repair facilities, wet docks, lift docks, dry docks, gates for graving docks, floating docks, slipways, locks and gates.

	to trustion Aspects	9 Hours
Module No. 5 Port Am	enities & Operations and Construction Aspects	1 storage aprops, cargo handling
Ferry, Transfer bridges, float equipment, purpose and ger construction of expansion at Maintenance of waterways, C of polluted dredged materials,	ing landing stages, transit sheds, warehouses, con- beral description: stack area, single point moorin ad renovation of existing Inland Port Infrastructu Construction of environmentally engineered banks, development of river information services.	ng, IS provisions, Cargo handing ng, IS provisions. Planning and re. Inland Waterways and ports: Dredging, Processing and storing
Text Books		
1. Fundamentals of Por	t Engineering by Koos Schoonces (2022).	
2. Airport, Docks & Ha	<i>bours Engineering</i> by Royal Book Publishing (202	1).
References		1005 Classics Dub House
 R. Srinivasan and S. Anand 	C. Rangwala, Harbour, Dock and Tunnel Engine	eering, 1995, Charotar Pub.House,
2. S. P. Bindra, A Cours	e in Docks and Harbour Engineering, 1992, Dhanpa	atRai& Sons, NewDelhi
3. IS Codes: 4651 (Part	I to V), 7314, 9527 (Part I, III, IV, VI), 10020 (Part	IV).
 Alonzo Def. Quinn, Company, New York 	Design and Construction of Ports and Marine	Structure, McGraw - Hill Book
5. Pera Brunn, "Port En	gineering", 1st Edition, Gulf Publishing Company,	2001.
Course Type	Theory (TH)	
Mode of Evaluation	Theory Examination-1 15 Examination-2 15 Assignment/ Quiz 20	100%
	Final Assessment Test 50	
Prepared by	Ms. Swati Pathak	
Recommended by the Board of Studies on		
Date of Approval by the Academic Council		

PO/PS O CO	PO 1	РО 2	PO 3	РО 4	РО 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PSO 1	PSO 2
CO1	3	0	0	0	0	1	1	0	1	1	0	2	2	0
CO2	3	1	0	0	1	1	1	0	1	1	0	. 2	1	0
CO3	2	1	3	0	1	1	1	0	1	1	0	2	1	1
C04	2	1	3	0	1	1	1	0	1	-1	0	2	1	1
C04	2	1	3	0	1	1	1	0	1	1	0	2	1	1

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Department of Civil Engineering Chandigarh Engineering College, Jhanjeri Mohali, Punjab 140307

Course Code: CE309	Course Title Prestressed concrete	ТРС	3	0	3
Version No.	1.0	1		I	
Course Pre-requisites/ Co- requisites	CE203				
Anti-requisites (if any)	None				
Objectives:	 Develop an advanced systems of prestressed concrete Analyze and design the statically determinate prestress Demonstrate the stresses with anchorage system in pr Analyze and design the statically indeterminate prestress 	membe sed conc estresse essed co	rs crete m d conci ncrete	embers rete men members	nbers. s

	CO-PO Mapping	
Course Outcomes	Course Outcome Statement	PO's / PSO's
CO1	Find out the losses in prestressed concrete and enhance its concepts, which include pre and post tensioning processes.	PO1, PO4, PO7/ PSO1, PSO2
CO2	Analyze and Design the statically determinate prestressed concrete members.	PO1, PO4/ PSO1, PSO2
CO3	Design the end blocks of prestressed concrete members.	PO1, PO3, PO12/ PSO1, PSO2
CO4	Design the end blocks of prestressed concrete members.	PO1, PO3, PO4, PO7/ PSO1, PSO2
CO5	To analyze the structure using Ultimate strength in flexure with code provisions.	PO1, PO3, PO12/ PSO1, PSO2
	TOTAL HOURS OF INSTRUCTIONS:	45

IUTAL HOUR	ISTRUCT	10143.45	

Module No. 1	Introduction to Prestressed Concrete	8 Hours
Materials - High streng	th concrete and High tensile steel - Pre-tensioning and Post tension	ing methods - Systems of
Prestressing.Losses in P	restress - Analysis of PSC flexural members –Basic concepts- Ultimate	strength in flexure –Codal
provisions.		

Module No. 2Statically Determinate PSC Beams8 HoursDesign of flexural members for ultimate and serviceability limit states – Analysis and design for Shear and Torsion - Codal
provisions.Transmission of prestress in pre-tensioned members – Anchorage zone stresses for post-tensioned members.8 Hours

Module No. 3Statically Indeterminate Structures9 HoursAnalysis and design of continuous beams and frames – Choice of cable profile – Linear transformation and concordancy -
Analysis and design of prestressed concrete Pipes and Columns with moments.9 Hours

Module No. 4	Design of structural elements	9 Hours
Analysis and design of	various structural elements like slab, column, beam-column. Application	in the design of prestressed
pipes and prestressed	concrete cylindrical water tanks.	
Module No. 5	Composite Construction	11 Hours
Analysis and design of c	omposite construction with precast PSC beams and cast in situ RC slabs –	Creep and Shrinkage effects
 Partial prestressing pri 	nciples, analysis and design concepts – Crack width calculations.	

- 1. Kim S. Elliott, Precast Prestressed Concrete for Building Structures, CRC Press, 2023
- 2. N. Rajagopalan, Prestressed Concrete: Building, Design, and Construction, Springer, 2023

References

- 1. Prestressed Concrete by Ramamrutham; Dhanpatral Publications.
- 2. Design of Prestressed concrete structures (Third Edition) by T.Y. Lin & Ned H.Burns, John Wiley & Sons.
- 3. Codes: IS 1343 BIS code of practice for Prestressed concrete.

Course Type	Theory (TH)	,
	Theory	100%
	Examination-1	15
Mode of Evaluation	Examination-2	15
whole of Evaluation	Assignment/ Quiz	20
	•	N 4
	Final Assessment Test	st 50
Prepared by	Dr. Gaurav Juneja	and the second second second second
Recommended by the		
Board of Studies on	the second second	
Date of Approval by		
the Academic Council	5 5 5 6 mg	

PO/PSO	001		0.00		1001									
CO	100	POZ	P03	P04	P05	P06	P07	P08	PO9	PO10	P011	PO12	PSO1	PSO2
CO1	3		-	2		-	2	-	-	-		-	2	2
CO2	3		-	3	-		-	-	-	·	-	-	2	2
CO3	3		2		-	1	164 July -	· •				1	2	2
CO4	3		. Carrie	2	2		2		1	à≚ .	-	<u> </u>	2	2
CO5	3	•	2		-		-	-		-	-	1	2	2
CO5	3	-	2		-	-	-	-	-	, -	-	1	2	

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Department of Civil Engineering Chandigarh Engineering College, Jhanjeri Mehali, Punjab 140307

Cou	Irse Code: C	E310 Co	<mark>urse Title</mark> Earthqua	ke Engine	eering			TPC	3	0	3
Ver	sion No.	1.0									
Cou Co-	1rse Pre-requ requisites	lisites/ CE	2203								
Ant	ti-requisites (if any) No	ne								
Obj	jectives:	1. 2. 3. 4. 5.	To provide a cohere To present basic eng Implementation of e Application of plant To study IS Code gu	nt develop gineering c ongineering ning, analy nidelines fo	oment to stuc concepts rela g concepts in rsis and desi- pr effective	dents for courses ir ated to earthquake n field of earthquak gn of earthquake d earthquake resistar	n eart engir ke en esigr nt bui	hquake neering gineeri n philos lding c	e eng ng soph const	ginee y ructi	ring on
r			С	CO-PO Ma	apping						-
	Course Outcomes		Course Outcome S	tatement		PO's	/ PS	O's			
	CO1	Outline Engineerin	Basic Knowledg	e in	Earthquake	PO1, PO2, PO3,	PO5/	PSO1	, PS	02	
	CO2	Learning	he behavior from pas	st damages	5	PO1, PO2, PO3,	PO5/	PSO1	, PS	02	
	CO3	Learning analysis	the physics of struc	tures from	n vibration	PO1, PO2, PO3,	PO5/	PSO1	, PS	02	
	CO4	Discuss e buildings	arthquake forces in	structural	design of	PO1, PO2, PO3,	PO5/	PSO1	, PS	02	
	CO5	Use various of structure	us code provisions fo res	r design aı	nd analysis	PO1, PO2, PO3,	PO5/	PSO1	, PS	02	
			TOTAL HOU	RS OF IN	STRUCTI	ONS: 45					
		.		-			0.11	r			
Mo Dof	dule No. 1	iha aartha	duction to Earthque	akes	to ourthau	aka Idantify caus	9 H	lours	anal	70 OF	nd ite
mea	asurement	nbe earing	uake and terminolog	gy related	to eartiqua	ake, identify caus	es o	eartin	quak	le al	ia its
Mo	dule No. 2	Past	Earthquake and Le	ssons Lea	rnt		9 H	lours			
Ident	ify the lesson	s learnt from	n the previous earthq	uakes, Ide	ntify various	s damages to build	ings	due to	Eart	hqua	kes
Mo	dule No. 3	Intro	duction to Theory o	f Vibratio	ons		9 H	lours			
Intro	duction to the	ory of vibra	tions, its sources and	l types, De	gree of Free	edom, SDOF, Dam	pnes	s and v	ariou	us tyj	pes
of Da	amped Structu	ires,					01				
	ral Earge And	Late	ral Force Analysis	and Shaa	w Walla C	opport of saismia	9 n	ours	torol	Stro	nath
Stiff	al Force Ana	and Struct	ural Configuration	and Shea	u walls, Co	oncept of seismic	uesi	gii, La	lerai	Sue	ingui,
Mo	dule No. 5	IS C	ode Provisions				9 H	[ours			
Intr	oduction to Pr	ovisions of	IS Code 1893, 4326,	, 1905 and	13920						
Tex	 ext Books 1. Dynamics of Structures with Earthquake Engineering, Ashok K Jain, Pearson Publishers Ltd (2023) 2. Earthquake Resistant Design of Structures, Pankaj Aggarwal, Manish Shrikhande 										
Ref	erences										
	1. Dynamic	es of Struc	ture, Theory and Ap	pplication	s of Earthq	luake Engineering	g, A.	K Cho	opra		
	2. Earthqua	ake Resista	nt Design, David J	Dowrick							
Cou	ırse Type		Theory (TH)								
Мо	de of Evaluat	tion	Theory Examination Examination Assignment/	-1 -2 Quiz	15 15 20	100%					

	Final Assessment Test 50
Prepared by	Dr. Anshu Tomar
Recommended by the Board of Studies on	
Date of Approval by the Academic Council	

PO/PSO														
со	P01	POZ	PO3	PO4	PO5	PO6	P07	P08	PO9	PO10	PO11	P012	PSO1	PSOZ
CO1	3	2	2		1			-	-				7	
CO2	3	2	2								-	-	2	2
602		-	~	-	1	-	-	-	-	-	-	-	2	2
03	3	2	2	•	1	-	-	-	-	-	-	-	2	2
CO4	3	2	z	-	1	-	-	-	-					2
C05	2	2			-				-	-	-	-	Z	2
	3	_ 2	2	-	1	-	-	- 1	-	- 1	-	-	2	2

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Head

Department of Civil Engineering Chandigarh Engineering College, Jhanjeri Mohali, Punjab 140307

Course Code: CE313	Course Title Bridge Engineering	ТРС	3	0	3
Version No.	1.0			1	<u>I</u>
Course Pre-requisites/ Co- requisites	None				
Anti-requisites (if any)	None				
Objectives:	The course focuses on understanding the behavior components according to the Specification of Indian Roa and on par with current Industry practices	and des Id Congr	sign of ress coo	various de requir	bridge ements
	CO-PO Mapping				

Course Outcomes	Course Outcome Statement	PO's / PSO's
CO1	To learn the principal of bridge design	PO1, PO4/ PSO1, PSO2
CO2	Understand the need and importance of preliminary investigation on bridge construction site.	PO1, PO4, PO7/ PSO1, PSO2
CO3	Familiarize the specification of road bridges and loads to be considered.	PO1, PO4/ PSO1, PSO2
CO4	Design components of different types of bridges and assess load carrying capacity of bridges.	PO1, PO3, PO12/ PSO1, PSO2
CO5	Familiarize with different methods of inspection of bridges and maintainance.	PO1, PO3, PO4, PO7/ PSO1, PSO2
	TOTAL HOURS OF INSTRUCTIONS:	45

Module No. 1 **Components of bridges**

Classification of bridges - Importance and investigation for bridges - Hydrology - design flood discharge, linear waterway, and scour depth - Choice of Bridge Type, subsoil exploration, location of piers and abutments. Specification of road bridges width of carriage way, IRC loads to be considered, calculation of live load by effective width method. Madula No. 2

8 Hours

Module No. 2	Design consideration	8 Hours
General Design Consider	ration – design of pipe culvert, design of Slab Bridge, design of T-beam Brid	dge, design of box culverts –
Company and the standard standard	an installed of DC holes and exactly an heider and Decatarian constants heide	The second se

Components and design principles of RC balanced cantilever bridge and Prestress concrete bridges. Type of sub structures -Forces acting on substructures – Design of abutments, piers – Types of Foundations.

Module No. 3 **Bridge bearings** 9 Hours Importance of bearings - types of bearings- design of elastomeric bearings - joints - types of joints. Construction and maintenance of bridges – Assessment of load carrying capacity of bridges – Lessons from bridge failures.

Module No. 4	Plate girders and composite bridge	9 Hours				
Plate Girders bridge: Introduction, elements of plate girder and their design, design of a deck type welded plate girder – bridge of single line B.G.						
Composite bridges: Adv	antages- design philosophy of composite bridges consisting of RCC slabs	over steel girders including				
shear connectors.						
Module No. 5	PSC Bridges	11 Hours				
Introduction to Pre and Post Tensioning, Proportioning of Components, Analysis and Structural Design of Slab, Analysis of						
Main Girder using COURBON's Method for IRC Class AA tracked vehicle, Calculation of pre-stressing force, cable profile and calculation of stresses. Design of End block and detailing of main girder.						

Text Books

1. Rangwala. Bridge Engineering. 17th ed., Charotar Publishing House, 2023.

 D.Johnson Victor, "Essentials of bridge engineering", Oxford University Press, 2019. N.Krishna Raju, "Design of bridges", Oxford University Press, 2019.

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References

- E.J. O'Brien and D.L. Keogh, "Bridge deck analysis", Spons Architecture, 1999. Raina, V.K. "Concrete Bridge Practice", Shroff Pub & Dist. Pvt. Ltd, 2007. Ponnuswamy, S., "Bridge Engineering", Tata McGraw – Hill Education, 2007.
- 2. IRC Codes (IRC 5 2015, IRC 6-2017, IRC 112-2011, IRC SP105-2015, IRC SP13-2004, IRC SP37 -2010, IRC SP114-2018, MORT&H)

Course Type	Theory (TH)					
	Theory			100%		
	Examination-1	15				
Mode of Evaluation	Examination-2	15	•			
	Assignment/ Quiz	20				
	Final Assessment Tes	t 50	a den a de se a seconda esta esta esta esta esta esta esta est	*		
Prepared by	Dr. Gaurav Juneja	- 20				
Recommended by the		, · · · · ·				
Board of Studies on	and an an an and an and					
Date of Approval by					1	
the Academic Council	· · · · · · · · · · · · · · · · · · ·					

PO/PSO		0.00												
со	1 101	P02	PO3	P04	POS	P06	P07	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3			3		-		· .	-	-	-	-	2	2
CO2	3		- 1. 1.	2			2		•	-	-	-	2	2
СОЗ	3	. - .,	·	3	-	1.	- <u>-</u>	°	•	-	-	-	2	2
CO4	3	•	2	in the second se		. 3.1		-	-	.	-	1	2	2
CO5	3	2-1-1-		2	2	-	2	-	- "	<u> </u>		-	2	2

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Department of Civil Engineering Chandigarh Engineering College, Jhanjeri Mohali, Punjab 140307

Course Code: CE314	Course Title Environment Engineering	ТРС	3	2	4			
Version No.	1.0							
Course Pre-requisites/ Co- requisites	None							
Anti-requisites (if any)	None							
	1. Provide knowledge of water quality requirement for domestic usage							
	2. Outline planning and the design of water supply systems for a							
Objectives:	community/town/city							
	3. Impart knowledge on design of water distribution network							

Course Outcomes	Course Outcome Statement	PO's / PSO's		
CO1	Understand the impact of humans on environment	PO1,PO5, PO10, PO11,PO12/,		
001	and environment on humans.	PSO1		
	Be able to identify and value the effect of the	PO1, PO2, PO5, PO6, PO12/ PSO1		
CO2	pollutants on the environment: atmosphere, water			
	and soil.			
	Be able to select the most appropriate technique for	PO1, PO5, PO6, PO10, PO12/ PSO1		
CO3	the treatment of water, waste water, solid waste			
	and contaminated air.			
CO4	De component mith hogie environmentel le sieletion	PO1, PO2, PO5, PO5, PO10, PO12/		
C04	Be conversant with basic environmental legislation.	PSO1		
CO5	Be conversant with Solid waste management and	PO1, PO2, PO5, PO5, PO10, PO12/		
005	Plumbing.	PSO1		
TOTAL HOURS OF INSTRUCTIONS: 45				

Module No. 1Water9 HoursSources of Water and quality issues, water quality requirement for different beneficial uses, Water quality standards,
water quality indices, water safety plans, Water Supply systems, Need for planned water supply schemes, Water
demand industrial and agricultural water requirements, Components of water supply system; Transmission of water,
Distribution system, Various valves used in W/S systems, service reservoirs and design. Water Treatment: aeration,
sedimentation, coagulation flocculation, filtration, disinfection, advanced treatments like adsorption, ion exchange,
membrane processes

Module No. 2Introduction to sanitation9 HoursSystems of sanitation, relative merits & demerits , collection and conveyance of waste water , sewerage –
classification of sewerage systems. Estimation of sewage flow and storm water drainage and fluctuations, types of
sewers, design of sewers, appurtenances in sewerage system, cleaning and ventilation of sewers.

Module No. 3	Pumping of wastewater 9 Hours					
Pumping stations – location, components, suitability of pumps for pumping of wastewaters. House Plumbing:						
Systems of plumbing, s	Systems of plumbing, sanitary fittings and other accessories, one pipe and two pipe systems. Design of building					
drainage. Sewage chara	cteristics, Sampling and analysis of wastewater - Physical, Chemical	and Biological				
Examination-Measuren	nent of BOD and COD - BOD equations.					
Module No. 4	Treatment of sewage	9 Hours				
Primary treatment -Screens-grit chambers-grease traps-floatation- design of preliminary and primary treatment units						
- Aerobic and anaerobic treatment process - Suspended growth process: Activated Sludge Process, principles,						
designs, and operationa	1 problems, modifications of Activated Sludge Processes, Oxidation	ponds. Aerated Lagoons.				

Attached Growth Process: Trickling Filters

Modul	e No. 5 Solid v	aste management and Plumbing	g 9 Hours				
Munici	pal solid waste, Com	position and various chemical and	nd physical parameters of MSW, MSW management:				
Collect	Collection, transport, treatment and disposal of MSW. Special MSW: waste from commercial establishments and						
other	urban areas, solid w	aste from construction activit	tes, biomedical wastes, Effects of solid waste on				
enviroi	ament: effects on air,	soll, water surface and ground	I health hazards. Disposal of solid waste-segregation,				
various	types of home number	and recycle. Disposal methods	nd waste water disposal high rise building plumbing				
Storage	e tanks Building drain	age for high rise buildings vari	ous kinds of fixtures and fittings used				
Text B	looks		ous kinds of fixtures and fittings used.				
1.	Principles of Enviro	nmental Engineering & Science	e (4th Edition, 2021), Mackenzie L. Davis & Susan J.				
	Masten, Publisher: N	IcGraw-Hill.					
2.	Standard Handbook	of Environmental Engineering ((2nd Edition, 2021), Robert A. Corbitt, McGraw-Hill.				
3.	Introduction to Envi	ronmental Engineering and Sc	ience by Gilbert Masters, Prentice Hall, New Jersey,				
	2007.						
4.	Plumbing Engineerir	g. Theory, Design and Practice,	, S.M. Patil, 1999				
5.	Integrated Solid Was	te Management, Tchobanoglous	s, Theissen & Vigil. McGraw Hill Publication				
Refere	ences						
1.	Environmental Engin	eering by D. Srinivasan, PHI Le	earning Private Limited, New Delhi, 2011.				
2.	Water Supply and Sa	nitary Engineering – G.S.Birdie	and J.S.Birdie				
3.	Etnier, C. and Guters	tam, B., Ecological Engineering	for Wastewater Treatment, Lewis Publishers.				
4.	Masters, G. M., "In	troduction to Environmental E	ngineering and Science", Prentice-Hall of India Pvt.				
	Ltd.,1991.						
Lab E	xercise						
1. To n	neasure the pH value of	f a water/waste water sample.					
2. To d	letermine optimum Alı	am dose for Coagulation.					
3. To f	ind MPN for the bacte	riological examination of water.					
4. To f	ind the turbidity of a g	iven waste water/water sample					
5. To f	ind B.O.D. of a given	waste water sample.					
0. 10 II 7. Dete	neasure D.O. of a give	n sample of water.					
7. Dele 8 Dete	rmination of total soli	ds dissolved solids suspended	solids of a given water sample				
9 To d	letermine the concentr	ation of sulphates in water/wast	ewater sample				
10 To	find chlorides in a giv	en sample of water/waste water	ewater sample.				
10. To	find acidity/alkalinity	of a given water sample	•				
12. To	determine the COD of	a wastewater sample.					
13. Pro	pject 1	1					
14 Pro	ject 2						
15 Proj	ject 3						
Course	е Туре	Embedded Theory and Lab	(ETL)				
		Theory	75%				
		MST-1	15				
		MST-2	15				
Mode	of Evaluation	Assignment/Quiz	20				
		Final Assessment Test	50				
		Laboratory	25%				
Prepar	red by	Ms. Swati Pathak					
Recom	mended by the						
B oard	of Studies on						
Date o	f Approval by						
the Ac	ademic Council						

PO/PS O CO	PO 1	PO 2	PO 3	РО 4	PO 5	PO 6	PO 7	РО 8	PO 9	PO1 0	PO1 1	PO1 2	PSO 1	PSO 2
CO1	3				1					1	1	1	1	
CO2	2	1			1	1						1	1	
CO3	2	1			1					1		1	1	
CO4	2	1			1						1	1	1	
CO5	2	1			1						1	1	1	

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Department of Civil Engineering Chandigarh Engineering College, Jhanjeri Mohali, Punjab 140307

Course Code: CE402	Course Title Finite Element Analysis	TPC 3 0 3				
Version No.	1.0	· · · ·				
Course Pre-requisites/ Co- requisites	None					
Anti-requisites (if any)	None					
Objectives: 1. The objective of this course is to enrich the student's knowledge about the FEM 2. Evaluate the performance of one dimensional and two-dimensional problems. 3. Analyze and provide approximate solutions to any finite element problems						
CO-PO Mapping						

Course Outcomes	Course Outcome Statement	PO's / PSO's
CO1	To recall the fundamentals of engineering mathematics and theory of structures.	PO1, PO4, PO7/ PSO1, PSO2
CO2	To understand the energy principles, finite element concept, stress analysis, meshing, nonlinear problems and its applications.	PO1, PO4/ PSO1, PSO2
CO3	To apply the basic concept of finite element method to solve solid mechanics problems.	PO1, PO3, PO12/ PSO1, PSO2
CO4	Analyze and provide approximate solutions to any finite element problems.	PO1, PO3, PO4, PO7/ PSO1, PSO2
CO5	Evaluate the performance of one dimensional and two-dimensional problems.	PO1, PO3, PO4, PO7/ PSO1, PSO2
	TOTAL HOURS OF INSTRUCTION	ONS: 45

Module No. 1	INTRODUCTION	12 Hours
Introduction of the F	EM and its historical background, Brief overview of the steps u	ised in FEM and various
approaches to formul	ate elemental equations, Review of the concept of stresses, strains	s, equilibriums, boundary
conditions, temperature	re effect and there relations, Concept and application of Minimum	Potential energy method,

Rayleigh Ritz method, Galerkin Method.

Module No. 2MATRIX ALGEBRA & GAUSS ELIMINATION METHOD10 Hours

Matrix algebra and its different operations, Eigen values and Eigen vectors, Positive definite matrix, Gauss elimination method to solve large linear equations.

Module No. 3	1D, 2D DIMENSIONAL PROBLEM	08 Hours								
Shape functions, Finite	Element Formulation using Cartesian Coordinates, Application to 1	D problems, Convergence								
criteria.										
Triangular and Rectangular element formulation using Cartesian Coordinates, Application to 2D stress analysis.										
Module No. 4	TRUSSES	8 Hours								
Introduction, 2-D and	d 3-D trusses, concept of local and global coordinate system	and its transformation								
matrix, solution of 2	-D and 3-D trusses by the FEM, stress calculations, Accoun	ting of the temperature								
effect, computer prog	gramming concepts and its implementation to FEM, sample sou	arce code of processing,								
pre and post processing	ng of the FEM									

Module No. 5	BEAMS AND FRAMES	7 Hours
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Introduction, Potential energy based FE formulation using beam and frame elements, Boundary consideration, shear stress and bending moment calculations.

Text Books

- 1. R. D. Cook, D. S. Malkus, M. E. Plesha, and R. J. Witt, Concepts and Applications of Finite Element Analysis, 2021, Fourth Edition, Wiley.
- 2. J. N. Reddy, An Introduction to the Finite Element Method, 2021, Fourth Edition, McGraw-Hill Education.
- 3. K. J. Bathe, Finite Element Procedures, 2021, Prentice-Hall.

References

- 1. Olek C Zienkiewicz, Robert L. Taylor, The Finite Element Method: Volume 1 The Basis, 2021, Seventh Edition, Elsevier.
- 2. T. J. R. Hughes, The Finite Element Method: Linear Static and Dynamic Finite Element Analysis, 2021, Dover Publications.
- 3. S. P. Desai, and J. F. Abel, Introduction to Finite Element Methods: Theory and Applications, 2021, McGraw-Hill Education.

Course Type	Theory (TH)
Mode of Evaluation	Theory100%Examination-115Examination-215Assignment/ Quiz20Final Assessment Test50
Prepared by	Mr. Sourabh Dhiman
Recommended by the Board of Studies on	
Date of Approval by the Academic Council	na na sang akang na Presidente den di keter Papa dan kenang na

PO/PSO	PO1	PO2	PO3	PO4	PO5	PO6	P07	PO8	P09	PO10	P011	PO12	PSO1	PSO2
CO	-			2	-	-	2	-		-		-	2	2
601	3			2	And the	3.#1940.0	Education I.	-					2	2
CO2	3	-	- 1	3	1.2 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	The second	eni su		Q			1	2	2
CO3	3	1	2	Server in	•							-	-	-
CO4	3	-	- (2	2	1.011.103	2	-	· -		•	-	2	
CO5	3	-	- 1	2	2	-	2	-	- 1	1.1	-	•	2	2

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Head Department of Civil Engineering Chandigarh Engineering College, Jhanjeri Mohali, Punjab 140307

										
Course Code	: CE306	Course Title Transportation Engine	ering	TPC	3	2	4			
Version No.		1.0								
Course Pre-r requisites	requisites/ Co-	CE302								
Anti-requisit	es (if any)	None								
Objectives:To develop knowledge of Highway Geometric Desig formulate the fundamental principles of traffic flow characteristic measurements and their interpretation for infr changes or development. To develop an understanding of 							n and to w, traffic rastructure f highway f highway			
		CO-PO Mapping								
Course Outcomes	Cou	urse Outcome Statement	PO's / PSO's							
CO1	Identify the geor	metric features of the highway.	PO1, PO2, PO3, PO9, PO10, P12, PSO1, PSO2							
CO2	Analyse the traffic changes to or de Design of traffic	fic studies necessary for making signing new road infrastructure.	PO1, PO2, PO3, PO4, PO5, PO9, PO10, P12, PSO1, PSO2							
CO3	Choose suitabl pavements.	e materials for construction of	PO1, PO2, PO PO10, P12, PS	03, PO4 SO1, P	4, P SO2	05, 2	, PO9,			
CO4	Design of flexib	le and rigid pavements	PO1, PO2, PO PO10, P12, PS	03, PO4 SO1, P	4, P SO2	O5, 2	, PO9,			
CO5	Assess the cor maintenance me geometrics and	nditions of pavements and apply easures, Analyze and design road pavements using suitable materials.	PO1, PO2, PO PO10, P12, PS	03, PO4 SO1, P	4, P SO2	05, 2	, PO9,			
		TOTAL HOURS OF INSTRUCTIO	NS: 45							
Module No. 1 Highway Coometric Design 9 Hours										
Introduction t distance, over	o highway elemer taking sight distar	nts, Cross sectional elements, traffic s nce, overtaking zones, Super elevatio	eparators, roa n, transition cu	d marg urves,	gins des	,St ign	opping sight of vertical			
Module No. 2	2 Traffic ei	ngineering		10	Ног	irs				
Vehicle characteristics, human characteristics, traffic studies, presentation of traffic volume data. speed										

studies, spot speed studies, speed and delay studies, O&D studies, Traffic manoeuvres, traffic capacity studies, PCU, parking studies, accident studies and records, Relationship between travel time-capacity-volume-density speed, road markings and signings, signal design.

Module No. 3Highway Materials8 HoursSoil classifications, evaluation of soil strength, Stone aggregates, tests on bitumen, Design of bitumen
mixes.Design of bitumen

Module No. 4	Design of	f Highw	vay Pave	ments				8 Hou	S	
Types of pavement	structure,	design	factors,	Design	of	flexible	pavements,	Californi	a bearing	ratio
method, Design of Ri	gid Pavem	ents.								

lodule No. 5 Highway	Maintenance		10 Hours
Deterioration and damages Maintenance measures, str naintenance measures for r	in road infrastructure, ma uctural evaluation and streng gid pavements.	intenance requirement gthening of flexible pa	for road components, vements, Distress and
ab Exercise			
I. Tests on Sub-grade Soil			
2. California Bearing Rati	o Test		
3. Tests on Road Aggrega	tes		
4. Crushing Value Test			
5. Los Angles Abrasion V	alue Test		
6. Impact Value Test			
7. Shape Test (Flakiness a	nd Elongation Index)		
8. Tests on Bituminous M	aterials and Mixes		
9. Penetration Test			
10. Ductility Test			
11. Softening Point Test			
12. Flash & amp; Fire Poin	t Test		1
13. Bitumen Extraction Te	st		
14. Project 1			
15. Project 2			
Text Books	abusy Engineering" Khanna I	Publishers 2025	
1. Kadiyali, L. K., Hi 2. Ulahway Engineeri	ag by Khanna and Justo 2017	1 4011311013 20201	
2. Highway Engineeri	ng by Khanna and Justo 2011.		
1. The Handbook of Singapore CRC P	highway engineering-T.F.Fv	wa (Editor), National I	University of Singapore
Course Type	Embedded Theory and Lab (I	ETL)	
Course type	Theory	75%	
	MST-1	15	
	MST-2	15	
Mode of Evaluation	Assignment/Quiz	20	
	The Law and Test	50	
	Laboratory	30	25%
Prepared by	Mr. Syed Mohd. Arif		
Recommended by the			
Board of Studies on			
Date of Approval by the Academic Council			

PO/PS	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PSO 1	PSO 2
<u> </u>	1	2	1		-	-		-	1	1	-	2	1	1
	2	2	1 i	1	1		-	-	1	1	-	2	1	2
<u>CO2</u>	2	2	13	3	1		-		1	1	-	2	1	1
<u>CO3</u>	2	2	1	3	1	-	-		1	1	-	2	1	1
CO4	2	2	3	1	1	-	-	-	1	1		2.	2	1

(S.M. ARIF)

Head Department of Civil Engineering Chandigarh Engineering College, Jhanjeri Mohali, Pupiah 140207

Course Code: CE401	Course Title Estimation and Costing	TPC	3	0	3						
Version No.	1.0										
Course Pre-requisites/ Co- requisites	CE303										
Anti-requisites (if any)	None										
Objectives:	 Determination of quantities of items and laborengineering works. Preparation of estimate of the civil engineering works. Preparation of specification of construction items. To introduce the students in depth knowledge of well the quantity analysis of construction we structures, Water works & sanitary works, estimates, culverts, etc. 	our req orks. f profes vorks 1 Irrigati	uire ssio ike, on	nal m wc	nt of civil practice as nulti-storied orks, Road						

CO-PO Mapping												
Course Outcomes	Course Outcome Statement	PO's / PSO's										
CO1	Students will be able to learn the different methods of Quantity Surveying.	PO1,PO2,PO5,PO6,PO7,P O9,PO12/ PSO1, PSO2										
CO2	Students will gain knowledge about different rates and analysis of rates based on different specification.	PO1,PO2,PO3,PO4,PO5,P O7,PO9,PO11,PO12/,PSO2										
CO3	Students will gain knowledge about different tenders and contracts	PO1,PO2,PO5,PO8,PO9,P O10,PO11,PO12/ PSO1, PSO2										
CO4	Student will understand the accounting procedures adopted and the financial and sanction powers of different levels of the engineering departments	PO1,PO2,PO3,PO5,PO6,P O8,PO9,PO10,PO11/ PSO1, PSO2										
CO5	Understanding Valuation and Arbitration	PO1,PO2,PO3,PO5,PO6,P O8,PO9,PO10,PO11/ PSO1, PSO2										
	TOTAL HOURS OF INSTRUCTIONS: 45											

Module No. 1Estimates and Specification9 HoursMethod of building estimates, types, site plan index plan, layout plan, plinth area, floor area, Technical
sanction, administrative approval, estimate of buildings, roads, earthwork, R.C.C. works, sloped roof, roof
truss, masonry platform, complete set of estimate. Objectives and importance of specification, Specification of
materials, specification of works, specification as per building classification, Language of specific writing. Material
evaluation based on BIM modeling of structures.

Module No. 2 Rate Analysis

Prerequisites, factors affecting rate analysis, over head expenses, procedure for rate analysis, schedule of rates, Task work: labour requirement for different works, material requirement for different works, Rate analysis of different Items of work.

9 Hours

Module No. 3	Specifications	9 Hours										
Objectives and importan	ce of specification. Specification of mat-	erials, specification of works, specification as per										
building classification, L	anguage of specific writing											
Module No. 4	Tenders And Contracts	9 Hours										
Tender notice, tender do	cument, Contract-contractor and terms a	nd conditions of contract, Agreement, Form of										
Contract, Responsibility	of owner, Architect, Contractor and Eng	gineer										
Book Keeping: Work al	stract, material at site account, measure	ment book, muster role hiring and maintenance of										
equipment, record of bill	s, vouchers and receipt book											
Module No. 5 Va	uation and Arbitration	9 Hours										
Purpose of valuation, typ	bes of property- Depreciation, Sinking fu	nd, Lease hold and free hold property,										
obsolescence, Gross inco	ome, Outgoing and Net income, Capitali	zed value and year's purchase. Rental method of										
valuations, and typical p	roblems. Acts and legal decision make	ng process.										
Text Books												
I. B. N. Dutta, Es	timating and Costing In Civil Engineerin	ng, Ubs Publishers Distributors Ltd.										
2. S. C. Rangwala	, Estimating And Costing, Charotar Pub	lishing House, Anand										
3. G. S. Biridi, To 4. M.Chalirabarti	Estimating Costing Specification and	Valuation Calcutta										
 M.Chakroborti, Estimating, Costing, Specification and Valuation. Calculta P.W.D. Hand Book Is Codes 												
References	Now is codes											
1. Estimating and Publishers & D	Costing in Civil Engineering: Theory an istributors Pvt Ltd, India	ad Practice by B.N. Dutta (25th Edition, 2022), CBS										
2. Aggarwal, A., Reprint 2023.	Upadhyay, A.K., Civil Estimating, Cos	ting &Valuation, S.K Kataria & Sons, New Delhi										
3. Rangwala, S.C. Anand 2023.	., Elements of Estimating and Costing,	Professional practice, Charotar Publishing House,										
4. Chandola, S.P.	and Vazirani, Estimating and Costing, K	hanna Publication 2004.										
Course Type	Theory (TH)											
	Theory	100%										
	Examination-1 1	5										
	Examination-2	5										
Mode of Evaluation	Assignment/ Quiz 2	0										
	Final Assessment Test 5	0										
Prepared by	Ms. Swati Pathak											
Recommended by the		1										
Board of Studies on												
Date of Approval by the Academic Council												

PO/PSO CO	POI	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
C01	3	1	0	0	2	1	I	0	l	0	0	1	1	1
CO2	2	3	1	1	1	0	1	0	1	0	1	1	0	1
CO3	3	1	0	0	1	0	0	1	1	2	1	1	1	1
CO4	2	2	2	0	2	1	0	I	l	1	1	1	l	1
COS	2	2	2	0	2	1	0	1	1	1	1	1	1	1

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Head Department of Civil Engineering Chandigarh Engineering College, Jhanjeri

Program Elective -5

Course Code: CE212			Course Title Advanced Design of C	Concrete Structures	ТРС	3	2	4	
Version No.			1.0						
Course Pre-requisites/ Co- requisites			CE303						
Anti-requisites (if any)			None						
Objectives:			 To understand various types of building frames To understand configuration of water tanks To learn moment redistribution and analysis of Flat slabs Use various code provisions for correct design of retaining walls To learn analysis and design of various foundation systems 						
			CO-PO Mapping	unous roundation sy					
	Course OutcomesCoCO1Knowledge of		ourse Outcome Statement	PO's / PSO's					
			f different types of frames	PO1, PO2, PO3, P	PO5/ PSO1, PSO2				
	CO2	Knowledge of	f design of liquid retaining structures	PO1, PO2, PO3, P	03, PO5/ PSO1, PSO2 03, PO5/ PSO1, PSO2				
	CO3	Knowledge of	f design of Flat slabs	PO1, PO2, PO3, P					
	CO4	Knowledge of	nowledge of design of Retaining walls PO1, PO2, PO			3, PO5/ PSO1, PSO2			
	CO5	CO5Knowledge of design of Foundation SystemsPO1, PO2, PO3, PO5/ PSO1, PSO							
	TOTAL HOURS OF INSTRUCTIONS: 45								
Module No. 1 Building			Frame Analysis (Kani'a mathad, Substitute frame mathad), Analysis fr		9 Hours				
r ype Cant	ilever) conce	of ventical load	tion of moments design and detailing	of various compor	ents (co	ontin		beams	
and	columns with	uni or bi-axial l	bending)	S of the one to one point					
Module No. 2 Design o			f Water Tanks		9 Hours				
Intro	duction, Desi	ign criteria, De	sign of rectangular and circular concreases (IS code method)	ete water tank restin	g on gro	ound	l, De	sign of	
Module No. 3 Design of			f Flat slabs		9 Hours				
Adv	antages and d	lisadvantages o	f flat Slabs, basic action of Flat Slabs	s, Direct Design Me	ethod, E	quiv	alent	frame	
meth	nod, Codal pro	ovisions				<u>^</u>			
Module No. 4 Design o			f Retaining Walls		9 Hours				
Reta	ining walls- c	antilever and co	ounter-fort type	-					
Module No. 5Design of Foundations9 Hours						;			
Desi	gn of raft four	ndation and pile	foundation (individual and group)						

Text Books

- 1. Dr. V.L Shah Dr. S.R Karve, "Advanced Design Of Reinforced Concrete Structures", Standard Publishers (2024)
- 2. S Unnikrishna Pillai , Devdas Menon "Reinforced Concrete Design" (2022)
- Subramanian, N. "Reinforced Concrete Structures." Oxford University Press (2013) 3.

References

- 1. Dayaratnram P., "Limit State Analysis and Design", Wheeler Publishing company, Delhi.
- Varghese P.C., "Limit State Design of Reinforced Concrete", Prentice Hall of India, New Delhi
 IS 456-2000- Indian Standard. Plain and Reinforced concrete -Code of practice
- 4. IS 3370- Code of practice for concrete structures for storage of liquids
- 5. IS1343-2012- Code of practice for Pre-stressed concrete
- 6. Sinha, "RCC Analysis and Design", Vol. II and I, S. Chand and Co., New Delhi
- 7. Jain A. K., "Reinforced Concrete Design (Limit State)", NEM CHAND AND BROS, 2012
Lab Exercise

- 1. Overall approach to the software Introduction
- 2. Getting started : Overview of the STAAD.Pro environment, Keyboard shortcuts, Documentation, Member local and global axis
- 3. Modelling : Creating model objects, Properties and specifications, Supports
- 4. Overview of the IS Codes : IS 875 (Part 1 & 2) For calculation of Dead load and Live load Application of load in STAAD.Pro
- 5. Overview of the IS Codes : IS 875 (Part 3) : 2015 For wind force estimation for low rise and tall structures - Application of load in STAAD.Pro
- 6. Overview of the IS Codes : Limit state design as per IS 800:2007 part 1
- 7. Overview of the IS Codes : Limit state design as per IS 800:2007 part 2 Features available in STAAD.Pro
- 8. Overview of the IS codes : IS 1893 (Part 1) :2016, IS 13920, IS 1893 (Part 4) : 2015 Part 2 and features available in STAAD.Pro
- 9. Loads : Load application for Dead load, Live load, Wind load, Seismic load, etc., Create load list, load combinations, etc. in STAAD.Pro
- **10.** Important STAAD Commands
 - a) Technical references of few important STAAD commands
 - b) Analysis : Types of analysis, Pre-analysis commands, To check for soft stories and seismic code irregularities
- 11. Interpretation of the results Statics check, deflected shape, mode shapes
- **12.** Understanding the basics of Structural Dynamics from the perspective of earthquake engineering and wind engineering – Features available in STAAD.Pro
- 13. Design Steel design and Concrete design in STAAD.Pro Understanding of each design parameter and its impact on the design
- 14. Example -1 : RCC buildings Starting from geometry creation to design of main elements PART 1
- **15.** Example -1 : RCC buildings Starting from geometry creation to design of main elements PART 2

Text Book:

1. Manual for STAAD PRO

Co	urse Typ	e			Embed	ded T	heory	and L	ab(ET	TL)						
					Theory	7							75%)		
					Ν	AST-1			1:	5						
					Ν	AST-2			1.	5						
Mode of Evaluation					Assignment/Quiz 20											
					Final Assessment Test 50											
							utory						20 /	•		
Pr	epared by	7			Dr. Ansnu 10mar											
Re	commend	led by	the													
Bo	ard of Stu	idies o	n													
Da	te of App	roval	by													
the	Academ	ic Cou	incil													
	PO/PS	DO	PO	PO	PO	PO	PO	PO	PO	PO	D O1	D O1	D O1	DSO	PSO	
	0	гU 1	2			5	ru 4	FO	01			1	2	1	2	
	CO	T	4	3	4	3	U	/	o	у	U	I	4	I	2	
	CO1	3	2	2	-	1	-	-	-	-	-	-	-	2	2	
	CO2	3	2	2	-	1	-	-	-	-	-	-	-	2	2	

_CO3	3	2	2	-	1								
CO4	3	2	2		1	- f	-	-	-	-	-	2	2
CO5	3	2	2	-	1	 -		-	•	-	-	2	2
			_		1	-		-	-	-	-	2	2

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Department of Civil Engineering Chandigarh Engineering College, Jhanjeri Mohali, Punjab 140307

Course Code: CE214	Course Title Hydraulics & Hydraulic Machine TPC 3 2 4
Version No.	1.0
Course Pre-requisites/ Co- requisites	CE202
Anti-requisites (if any)	None
Objectives:	 To learn the fundamentals of Uniform and Non-Uniform flow in open channels. To impart the knowledge on pumps and turbines. Distinguish between different classes of pumps, their construction features and further Analyze their performance. Apply dimensional analysis and to differentiate the model, prototype and similitude conditions for practical problems. To Study the characteristics of hydroelectric power plant and its components.

CO-PO	Manning

Course Outcomes	Course Outcome Statement	PO's / PSO's
CO1	To understand the fundamental concepts of open channel hydraulics	PO1, PO2, PSO1
CO2	To understand the concept, applications, principles of hydraulic machines & hydraulic models.	PO1, PO2,PSO1
CO3	Apply dimensional analysis and to differentiate the model, prototype and similitude conditions for practical problems.	PO1, PO2,PO3,PO7
CO4	To estimate performance parameters of a given Centrifugal and Reciprocating pump.	PO1, PO2, PO9, PO10, PO12
C05	To select and analyze an appropriate turbine with reference to given situation in power plants.	PO1, PO2,PO3, PO4, PO9,PO10,PO12

TOTAL HOURS OF INSTRUCTIONS: 45

Module No. 1Open Channel Flow – Uniform Flow9 HoursTypes of flows - Type of channels – Velocity distribution – Energy and momentum correction factors – Chezy's,
Manning's; and Bazin formulae for uniform flow – Most Economical sections. Critical flow: Specific energy-
critical depth – computation of critical depth – critical sub-critical and super critical flows.9 HoursModule No. 2Open Channel Flow - Non - Uniform Flow9 HoursConcept of specific energy; Specific energy curves; Critical flow; Critical flow in a rectangular channel; Critical
slope; Different slope conditions; Channel transitions- Reduction in width of channels, hump; Momentum
principle applied to open channel flow; Specific force.6 Hours

Dimensional analysis-Rayleigh's method and Buckingham's pi theorem-study of Hydraulic models – Geometric, kinematic and dynamic similarities-dimensionless numbers – model and prototype relations.

Module No. 4	Hydraulic Pumps & Turbines	16 Hours

Concept of pump, Types of pump-centrifugal, reciprocating pumps, submersible pumps Centrifugal pump: Component parts and working, Reciprocating pump: single acting & double acting, Component parts and working, Suction head, delivery head, static head, Manometric head. Compute power of centrifugal pump, Selection & Choice of Pump. Classification; Impulse; Reaction; Radial, Axial, mixed and tangential flow turbines; Pelton, Francis turbines; Runner profiles; Velocity triangles; Head and efficiency; Draft tube theory; Similarity laws; Concept of specific speed and unit quantities; Selection of Turbines; Operational characteristics.

Module No. 5 Hydropower Engineering

5 Hours

Classification of Hydropower plants – Definition of terms – load factor, utilization factor, capacity factor, estimation of hydropower potential.

Text Books

- 1. Fluid Mechanics and Hydraulic Machines by R. K. Bansal, 11th Edition, Laxmi Publications, 2024
- **2.** Hydraulics and Fluid Mechanics including Hydraulic Machines by P. N. Modi and S. M. Seth; Standard Book house, New Delhi,23rd Edition 2022.
- **3.** R.K. Rajput, "Fluid Mechanics and Hydraulic Machines", S Chand & Company Ltd., New Delhi,6th Edition, 2022.

References

- 1. Flow in Open channels by K. Subramanya, 3rd Edition, Tata McGraw-Hill,2008.
- 2. A.K.Jain, "Fluid Mechanics Including Hydraulic Machines",8th Edition, Khanna Publishers, New Delhi, 2003.
- 3. Vijay Gupta & Gupta S.K., Fluid Mechanics, New Age International Publishers, New Delhi.

Lab Exercise

1 Verification of Bernoulli's equation

- 2 Determination of Coefficient of discharge for a small orifice by a constant head method
- 3 Flow through an Venturimeter
- 4 Flow through an Orifice Meter.
- 5 Calibration of Triangular / Rectangular/Trapezoidal Notch
- 6 Determination of Minor losses in pipe flow
- 7 Determination of Friction factor of a pipe line
- 8 Determination of Energy loss in Hydraulic jump
- 9 Determination of Manning's and Chezy's constants for Open channel flow.
- 10 Impact of jet on vanes
- 11 Performance Characteristics of Pelton wheel turbine
- 12 Performance Characteristics of Francis turbine
- 13 Performance characteristics of Kaplan Turbine
- 14 Performance Characteristics of a single stage / multi stage Centrifugal Pump
- 15 To determine the Meta centric height of a Floating Body under different condition.

Text Books

1.Fluid Mechanics and Machinery, C.S.P.Ojha, R. Berndtsson and P. N. Chadramouli, Oxford University Press, 2010

2. Hydraulics and Fluid Mechanics, P M Modi and S M Seth, Standard Book House

Reference Books

- 1. Theory and Applications of Fluid Mechanics, K. Subramanya, Tata McGrawHill
- 2. Fluid Mechanics with Engineering Applications, R.L. Daugherty, J.B. Franzini and E.J. Finnemore, International Student Edition, Mc Graw Hill.
- Course Type Embedded Theory and Lab (ETL)

	Theory		75%
	Examination-1	15	
	Examination-2	15	
Mode of Evaluation	Assignment/ Quiz	20	
	Final Assessment Test Laboratory	50	25%
Prepared by	Mr. Vineet Pandey		
Recommended by the			
Board of Studies on			
Date of Approval by			
the Academic Council			

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PO/PSO	PO	ро	PO	PO	PO	PO	PO 7	PO8	PO9	PO10	PO11	PO1 2	PSO1	2
CO	1	2	3	4	3								2	
COI	3	3				- (b,							2	
CO2	2	2				S. And								
C03	2	2	1				1		1	1		1		
C04	2	2		1.	1	New mark			2	2		2		
C05	3	1	3	1		14		1300	3	2				

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Head Department of Civil Engineering Chandigarh Engineering College, Jhanjeri Mohali, Punjab 140307

Program Elective -6

Course Code:CE308	Course	Title Remote sensing image processing	трс	3	2	4					
Version No.	1.0										
Course Pre-requisites/ Co- requisites	None										
Anti-requisites (if any)	None	None									
Objectives:	1. 2.	To introduce the student to the physical Ad Sensing, Hyperspectral Remote Sensing, LI their different application in terrestrial and v Acquire skills in handling instruments, tools while using Remote Sensing Technology.	vanced S DAR Re getation , technic	Satellit emote n mapp jues ar	e of Ren Sensing bing. Id mode	note and Iling					

CO-PO Manning

	co i o mapping			
Course Outcomes	Course Outcome Statement	PO's / PSO's		
C01	Get knowledge to the advanced Satellite of Remote Sensing, Hyperspectral Remote Sensing, LIDAR Remote Sensing and their different application in terrestrial and vegetation mapping.	PO1, PO4, PO7/ PSO1, PSO2		
CO2	Acquire skills in handling instruments, tools, techniques and modelling while using Remote Sensing Technology.	PO1, PO4/ PSO1, PSO2		
CO3	Get familiarized about various image enhancement and image processing techniques.	PO1, PO3, PO12/ PSO1, PSO2		
CO4	Get opportunity of employability opportunity in space organization.	PO1, PO3, PO4, PO7/ PSO1, PSO2		
CO5	To understand different type of sensors and their characteristics	PO1, PO4/ PSO1, PSO2		
	TOTAL HOURS OF INSTRUCTIONS:	45		

Module	No. 1		Advance	ed Sate	ellite remote so	ensing				9	Hours		
Satellite	and	its	classification.	Sun	synchronous	orbit	and	geostationary	orbit,	Remote	sensing	satellites	in
operation:LANDSAT,SPOT,IRS,INSAT,GEOSAT,IKONOS,QUICK BIRD,NOAA, TERRA their sensor characteristics and application.													

Module No. 2 Hyper spectral remote sensing

Hyper spectral Remote Sensing Hyper spectral image analysis: Atmospheric correction, Analysis technique of hyper spectral remote sensing, Biophysical modelling, Image transmission & compression. Spectroscopy, Image cube, Hyperian/HYSI, Spectral matching, Digital Spectral Data, Libraries, Application of Hyper spectral data, MODIS.

9 Hours

9 Hours

Module No. 3LIDAR Remote Sensing9 HoursFundamental of LIDAR remote sensing, LIDAR Data Processing, LIDAR Data Management and Applications,(Topographic
Mapping,flood inundation analysis, line-of-sight analysis, Forestry, various types of LIDAR sensors-, vegetation metric
calculations, Corridor mapping system,) Terrestrial and Bathymetric Laser Scanner.9 Hours

Module No. 4 Thermal and Microwave Remote sensing

Thermal and Microwave Remote sensing: Infrared Scanners, Scatterometer, Thermal Properties of Terrain, Thermal IR Environmental Considerations, Thermal Infrared and Thermal Scanners, Microwave Remote sensing concepts: Backscattering, Range Direction, Azimuth Direction, Incident Angle, Depression Angle, Polarization, Dielectric Properties, Surface Roughness and Interpretation, Speckle and Its Reduction, Applications of optical, thermal and microwave remote sensing.

Module No. 5	Ground Truth Data		9 Hours								
Ground truth data colle	ction - use of radiometers, and spectrophotomet	ers, etc Spectral Refl	ectance, Physical basis of								
spectral signatures of t	he objects and Spectral, Signature for Vegetation of SAR data (from Satellite) for Landusestudies	n, Soil, Water and Si	now. Thermal Image and								
Text Books	and of sale data (nom satellite) for Landasestudies.										
1. Prasad S. Ther	kabail, Remote Sensing Handbook, Volume II: Image	e Processing, Change	Detection, GIS, and Spatial								
Modeling, CRC	Press (2nd Edition, 2024)	2022									
Z. C.H. Chen, Sigr	al and image Processing for Remote Sensing, CRC Pr	ess, 2023									
Ketterences											
Remote Sensing of the Environment by J.R. Jensen, Pearson Publication											
2. Liudi. Kalige-K	erne Topographicidar by Michael S. Popslow	eulleu by claus weitka	amp.								
4. Remote Sensir	g and Image interpretation: Thomas Lille sand & R.W.	. Keifer, John Wiley ar	nd Sons (3rd Ed.).								
5. Text Book of R	emote Sensing & Cartography Kalyani Publication, D.	Nandi, T. Chattrejee.									
Lab Exercise											
1. Border inform	nation of satellite image.										
2. Study of sur	vey of India topo sheets (Base Map, Relief I	Map, Drainage Map	o, Natural vegetation,								
3 True colour a	on settlement)										
4. Satellite ima	ge Interpretation (Land use land cover, fores	t. Soil. Geomorpho	ology. Surface water.								
Geology)	5F (,,,,,	.,,									
5. DEM & DTN	I image.										
6. Interpretation	of tools of ERDAS and Arc GIS, Quantum GIS										
7. Download M	crowave data										
8. Download of	LIDAR data										
9. Layer stackin	g as for ground data collection for data Validation	for satellite image in	terpretation								
10. Field Exclose 11. Project 1	es for ground data confection for data vandation	for satellite image in	nerpretation.								
12. Project 2											
13. Project 3											
14. Project 4											
15. Project 5											
Course Type	Embedded Theory and Lab (ETL)										
	Theory	75%									
	MST-1 15										
	MST-2 15										
wode of Evaluation	Assignment/Quiz 20										
Final Assessment Test 50											
	Laboratory	25%									
Prepared by	Dr. Gaurav Juneja										
Recommended by the											
Board of Studies on											
Date of Approval by											
the Academic Council											

PO/PSO	PO1 PO2	02 PO3 PO4	PO5	PO6	PO7	P08	PO9	PO10	PO11	PO12	PSO1	PSO2	
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СО														
CO1	3	-	-	2	-	-	2	-	-	-	-	-	2	2

CO2	3	-		3		T	T	1	1	1		1	r	
CO3	2		-	-	<u> </u>	·	· ·	· ·			•	•	2	2
	3	•	2		•	•	•	-			-	1	2	2
CO4	3	•	· •	2	2		2			1			2	
COS	3			3									2	2
					-	and the state		-	And the second second				2	2

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Department of Civil Engineering Chandigarh Engineering College, Jhanjeri Mohali, Punjab 140307

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<u>ار</u> :

Course Code: CE403	Course Title Soil Dynamics and Machine Foundation	ТРС	3	2	4		
Version No.	.0						
Course Pre-requisites/ Co- requisites	305						
Anti-requisites (if any)	None						
Objectives:	 To familiarize students with the dynamic properties of soil. To create an understanding about the importance of designing machine foundation for reciprocating and impact machines. To gain ability to use the techniques, skills, and modern engineering tools necessary for engineering practice. 						

CO-PO Mapping

Course Outcomes	Course Outcome Statement	PO's / PSO's		
CO1	Recall fundamental concepts related to vibration, including formulation and mathematical equations.	PO1, PO4, PO7/ PSO1, PSO2		
CO2	Apply their acquired knowledge of various laboratory tests for dynamic loading and liquefaction.	PO1, PO4/ PSO1, PSO2		
CO3	Illustrate the ability to design piles for dynamic loading	PO1, PO3, PO12/ PSO1, PSO2		
CO4	Capacity building for designing shallow foundations for dynamic loading using numerical solution.	PO1, PO3, PO4, PO7/ PSO1, PSO2		
CO5	Critical analysis of the dynamic properties of soil through examination.	PO1, PO3, PO4, PO7/ PSO1, PSO2		
	TOTAL HOURS OF INSTRUCTION	NS: 45		

Module No. 1 **Introduction To Theory of Vibration**

9 Hours

Fundamentals of theory of vibrations-simple harmonic motion. Vibration analysis procedure- Free and forced vibration with and without damping. Formulation of mathematical model of different vibration modes.

Module No. 2	ule No. 2Dynamic Properties of Soil9 Hours							
Dynamic moduli, Dyna	mic elastic constants. Poission's Ratio, Damping ratio, Liquefaction	parameters, Laboratory						
techniques. Factors affe	ecting shear modulus, Elastic modulus and Elastic Constants. Propag	ation of seismic waves in						
soil deposits - Attenuat	ion of stress waves							
Module No. 3Liquefaction of Soil9 Hours								
Stress – Strain and Stre	ngth characteristics of soils under dynamic loads. Resonance column	test, Triaxial tests under						
dynamic loads. Liquefa	ction of soils and factors influencing liquefaction, Dynamic earth pro-	essure, retaining wall						
problems under dynami	ic loads							
Module No. 4Analysis of Piles in seismic domain9 Hours								

Analysis of piles under vertical vibrations. Analysis of piles under translation and rocking, Analysis of piles under torsion. Design procedure for a pile supporting the machine foundation 9 Hours

Machine Foundation Design Module No. 5

Types of machines and Foundations, Requirements of machine foundation. Permissible amplitude, soil pressure, stress of concrete, steel and timber. Design procedure of machine foundation.

Text Books

- 1. Prakash S and Puri, Foundations for Machines: Analysis and design, Wiley, New York, 1988.
- 2. Braja M. Das, Fundamentals of Soil Dynamics, Elsevier Publishers, New York. 1983.
- 3. Swami Saran, Soil Dynamics and machine foundations, Galgotia Publishers, New Delhi, 1997.

References	
1. Kramer S. L., Geot	echnical Earthquake Engineering – Pearson Education Inc. New Della
2. Bharat Bhushan P	rasad – Advanced Soil Dynamics and Earthquake Engineering, PHI Learning Pu
Emined, New Dein	Project
	Project
	1. Analysis of foundations for industrial machines and earthquake
]	2 Modelling and the line of The The
	2. Wodening and Analysis of Block Type Machine Foundation by
	Finite Element Method using STAAD Pro.
	on Saturated Sand
	4 Dynamic Response of Machine Provide Line Andrews
	Approach)
	5. Project 5
	6. Project 6
	7. Project 7
	8. Project 8
	9. Project 9
	10. Project 10
	11. Project 11
,	12. Project 12
	13. Project 13
	14. Project 14
	15. Project 15
Course Type	Embedded Theory and Lab (ETL)
	Theory 75%
	MST-1 15
Mode of Evaluation	MST-2 15
inde of Dianation	Assignment/Quiz 20
	Final Assessment Test 50
	Laboratory 25%
Prepared by	Dr. Anshu Tomar
Recommended by the	
Board of Studies on	
Date of Approval by he Academic Council	

PO/PSO														
со	P01	POZ	PO3	P04	PO5	P06	P07	PO8	PO9	PO10	P011	PO12	PSO1	PSO2
CO1	3	-	-	Z	-	-	2	-			-		2	2
CO2	3	-		3	-	-						-		2
CO3	3	-	Z		-	-	-		-			-	2	2
CO4	3			2	2	-	2		-			-	-2	2
CO5	3	-	-	2	2	-	2	-	-		-		- 4	2
											-	-	2	2

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Head direct

Department of Civil Engineering Chandigarh Engineering College, Jhanjeri Mohali, Punjab 140307

Program Elective -7

	00011		.										
Course Code	: CE211	Course Title Advanced Transportati	on Engineering	ТРС	3	2	4						
Version No.		1.0	1.0										
Course Pre-r requisites	equisites/ Co-	CE302											
Anti-requisit	es (if any)	None											
Objectives:		To develop knowledge of Highway Geometric Design , Highway pavement and Traffic Engineering. To develop knowledge of Railway Engineering, like permanent way, components of tracks etc. To develop knowledge of Airport Engineering like Runway, Taxiway, Airports etc.											
CO-PO Mapping													
Course Outcomes	se Course Outcome Statement PO's / PSO's												
CO1	Appreciate the transportation and	importance of different modes of d characterize the road transportation.	PO1, PO2, PO3	3, PO6, PO	12, P	SO2							
CO2	Alignment and ge Standards accord	eometry of pavement as per Indian ing to topography.	PO1, PO2, PO3	3,PO4, PO1	2, PS	501							
CO3	Understand the planning and d component of rail	importance of railway infrastructure esign & the functions of different lway track.	PO1, PO2, PO3	3, PO6, PO	12, P	SO2							
CO4	Outline the impor	rtance of Airport Infrastructure	PO1, PO5, PO6	5, PO12, PS	02								
CO5	Understand relate	ed to traffic control and management	PO1,PO2, PO3 PSO2.	, PO6, PO1	2,PS	01,							
		TOTAL HOURS OF INSTRUCTIO	NS: 45										
Adule No. 1 [I'ransportation Systems] 7 Hours													
Importance of modal transp operational an and Undergro	Transportation, I ortation system, nd economic prol und construction,	Different Modes of Transportation, C Characteristics of Mass Transit s blems, fixed Track Facility, Mass R Express Bus System.	haracteristics o systems includ apid Transit Sy	f Road Tra ing techn stem Elev	anspo ical, vated	ort. N der I, Su	Multi nand rface						
Module No. 2 Highway Development & Planning 8 Hours													

Module No. 2Highway Development & Planning8 HoursPrinciples of Highway Planning, Road Development in India, Classification of Roads, Road Patterns,
Planning Surveys; Highway Geometric Design: Cross Section Elements, Carriageway, Camber, Sight
Distances, Horizontal Curves, Extra-widening, Super-elevation, Vertical Curves, Highway Construction:
Right of way; Earthen/Gravel Road, Water Bound Macadam, Wet Mix Macadam, Bituminous Pavements,
Cement Concrete Pavements.

Module No. 3	Railway Engineering	10 Hours				
History of Railways, Development of Indian Railway, Organisation of Indian Railway, Railway Gauges,						
boice of Gauge, Uniformity of Gauge, Loading Gauge, Construction Gauge. Railway Track: Components						
of permanent way - Rails, Sleepers, Ballast, Sub-grade and Formation, Track Fixtures & Fastenings,						
Coning of Wheels, Tilting	ng of Rails, Adzing of Sleepers, Rail Joints, Creep of Rails					

Module No. 4 Airp	oort Engineering		10 Hours						
Introduction, Air Transport	Scenario in India and Stag	ges of Development, Na	ational and International						
Organizations; Airport plann	ing - Site selection, runway	v orientation, etc. Conce	pt of Head Wind, Cross						
Wind, Wind Rose Diagram	, Runway Configuration. A	Aircraft Parking Systen	n & Visual Aids: Main						
Taxiway, Exit Taxiway, Sep	aration Clearance, Holding	Aprons.: Marking and	Lighting of Runway and						
Taxiway, Landing Direction I	Indicator, and Wind Direction	n Indicator.	40.11						
Module No. 5 [Traine	Management & Koad Sale	ety	10 Hours						
Principles of Traffic manage	ement; Highway capacity a	nd Level of service; w	ixed Traffic Ilow: PUU						
markings: Channelization: At	faille stream parameters. Int	intersections Travel De	neu now, Noau Signs and mand Management: Role						
of ITS in traffic management	+ Road accidents. Causes of	road accidents. Vehicle	design factors & Driver						
characteristics influencing roa	ad safety. Road condition. Ro	and safety: 3 E measures.							
Text Books	<i>ad ballety</i> , <i>ite an construction</i> , <i>i</i>	<i>fud bullety: c 2</i>	<u></u>						
1. Kadiyali, L. R., "High	way Engineering", Khanna l	Publishers 2025.							
2. Kadiyali, L. R., "Traf	2. Kadiyali, L. R., "Traffic Engineering and Transport Planning", Khanna Publishers 2024.								
3. Railway Engineering Design & Operation, G Passerini, R Takagi, J.M Mera, Publisher:									
Witpress,2021.	Witpress,2021.								
4. Airport Engineering:	4. Airport Engineering: Planning & Design by S.C. Saxena, CBS Publishers & Distributors Pvt Ltd.								
2023.									
References									
1. The Handbook of r	highway engineering-T.F.F.	wa (Editor), National U	Jniversity of Singapore,						
Singapore, UKU Pres	S.	Engingaring" Khann	- Dublishang Now Dalhi						
2. Kaulyali, L.K. Fillu 1007	aples and Practice of right	ay Engineering, Mianin	a Publishers, new Denn,						
1777. Loh Evercise									
1. Specific Gravity and Water	r Absorption of Aggregates								
2. Ductility Test									
3. Marshall Stability Test for	Bituminous Mi								
4. CBR (California Bearing R	Ratio) Test – Lab (Soaked)								
5. Skid Kesistance Lest 6. Bankalman Beam Deflection	on Tost								
7 Roughness Measurement u	sing Bumn Integrator								
8. Project 1	and built meeting.								
9. Project 2									
10. Project 3									
11. Project 4									
12. Project 5									
14. Project 7									
15. Project 8									
-									
Course Type	Embedded Theory and Lab	(ETL)							
	Theory	75%							
	MST-1	15							
Mada of Franks Alar	MST-2	15							
Mode of Evaluation	Assignment/Quiz	20							
	Final Assessment Test	50							
	Laboratory	25%							
Prepared by	Mr. Syed Mohd. Arif								
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Recommended by the	
Board of Studies on	
Date of Approval by	
the Academic Council	

PO/PS	PO	PO1	PO1	PO1	PSO	PSO								
0	1	2	3	4	5	6	7	8	9	0	1	2	1	2
CO	1	1	1	-	-	2	-	-	-	-	-	1	-	1
CO1	2	1	2	1	-	-	-	-	-	-	-	1	1	-
CO2	1	-	2	-	-	1	2	-	-	-	-	1	-	-
CO3	2	1	2	-	-	1	-	-	-	-	-	1	1	-
CO4	1	-	-	-	1	2	-	-	-	-	-	1	-	1
CO5	2	1	1	-	-	1	-	-		-	-	2	1	1

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Head Department of Civil Engineering Chandigarh Engineering College, Jhanjeri Mohali, Punjab 140307

Course Code: CE312	Course Title Advanced Highway Engineering	ТРС	3	2	4						
Version No.	1.0										
Course Pre-requisites/ Co- requisites	CE306										
Anti-requisites (if any)	None	None									
	This course will enable students to										
Objectives	1. Plan the rural road network.										
Objectives.	2. Determine the sight distance, horizontal curvature, super elevation, grades,										
	visibility on vertical curves, cross section elements.										

CO-PO Mapping

Course Outcomes	Course Outcome Statement	PO's / PSO's
CO1	Determine the sight distance, horizontal curvature, super elevation, grades, visibility on vertical curves, cross section elements.	PO1, PO2, PO5, PO9, PO11,PO12, PSO1, PSO2
CO2	Justify the geometric design standards adopted for low volume roads.	PO1, PO5, PO6, PO7, PO9,PO11, PO12, PSO2
CO3	Plan surveys, and prepare survey forms.	PO1, PO5, PO6, PO7, PO9, PO11,PO12, PSO1, PSO2
CO4	Perform safety audit at different stages of road construction.	PO1, PO5,PO6, PO7, PO11, PO12, PSO1, PSO2
CO5	Design both flexible and rigid pavements for low volume roads.	PO1, PO3, PO4, PO5, PO9, PO12, PSO1, PSO2
	TOTAL HOURS OF INSTRUCTI	ONS: 45

Module No. 1Planning of roads:

8 Hours

Introduction to planning of low volume roads, concepts of network planning, selection of roadway alignment, factors affecting rout selection, engineering surveys for new road location.

Module No. 2	Geometric design parameters: 8 Hours										
Basic principles of g alignment, summit c	geometric design, design of horizontal alignment, curves, super elevurve, and vally curve standard of design of low volume road.	ation, design of vertical									
Module No. 3Materials:9 Hours											
Road materials for pavement construction, soil-subgrade, road aggregate, binder, test on soil, test on aggregates and test on bitumen, bituminous mix design, marshal stability method for mix design.											
Module No. 4	Design of pavement:	10 Hours									
Factors affecting pay	rement design function of pavement components, design of flexible	pavement by GI method,									
CBR method, burmis	ster layer. Design of rigid pavement by using IRC method.										
Module No. 5	Road construction:	10 Hours									

Specifications of material and construction of sub grade, subbase, base and surface layer, construction of non bituminous road, construction of bituminous roads, equipment required for construction, maintenance of low volume roads.

Text Books

1. Kadiyali, L. R., "Highway Engineering", Khanna Publishers 2025.

2. A. Veeraragavan, S.K Khanna and C.E.G. Justo, Highway Engineering, Nem Chand & Brothers, 2014.

3. Ethiopian Roads Authority, Design Manual for Low Volume Roads, Parts A-G: http://www.icafrica.org/knowledge-publications/article/design-manual-for-low-volume-roadsparts-a-g116/

References

 1. Gordon Keller & James Sherar, Low-Volume Roads Engineering: Best Management Practices – Field

 Guide,
 USDA
 Forest
 Service/USAID,
 2003.
 27

 http://www4.worldbank.org/afr/ssatp/Resources/HTML/LVSR/English/Added-2007/2003 LVREngineering-FieldGuide-USA-by-GKeller.pdf

2. IRC SP 20: Rural road manual, Indian road congress, New Delhi, 2002

3. Yan H. Huang, Pavement Analysis and design, Second Edition, prentice hall inc, 2004

4. Relevant IS and IRC codes

Lab Exercise

Tests on soil

- 1. Grain size analysis Wet sieve analysis
- 2. Liquid limit, plastic limit & Shrinkage limit
- 3. Compaction test & California bearing ratio test

Tests on aggregates

- 4. Shape tests Elongation, Flakiness Index & Combined Index
- 5. Aggregate impact value test
- 6. Los angeles abrasion value test
- 7. Specific gravity & Water absorption test
- 8. Stripping value test

Tests on cement & concrete

- 9. Fineness & Soundness
- 10. Std consistency & setting time of cement
- 11. Compressive strength
- 12. Project 1
- 13. Project 2
- 14. Project 3
- 15. Project 4

Course Type	Embedded Theory and Lab (ETL)								
	Theory		75%						
	Examination-1	15							
	Examination-2	15							
Mode of Evaluation	Assignment/ Quiz	20							
	Final Assessment Test	50	25%						
			23 /0						
Prepared by	Mr. Syed Mohd. Arif								
Recommended by the									
Board of Studies on									
Date of Approval by									
the Academic Council									

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PO/PSO	РО	PO8	PO9	PO10	PO11	POI	PSO1	PSO						
CO	1	2	3	4	5	6	7					4		-
CO1	3	1	0	0	2	0	0	0	1	0	1	2	1	1
CO2	2	0	0	0	1	1	1	0	1	0	1	1	0	1
C03	2	0	0	0	1	1	1	0	1	0	1	2	1	1
C04	3	0	0	0	2	1	1	0	0	0	1	1	1	1
04								0	1	0	0	1	1	1
CO5	2	0	2	1	1	0	0	0	1	0	0	1	1	1

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Department of Civil Engineering Chandigarh Engineering College, Jhanjeri Mohali, Punjab 140307

Co	urse Code: C	E404	Cours Mana	e Title: Construction Planning gement.	g And Project	TPC	3	2	4			
Ve	rsion No.		1.0									
Co req	urse Pre-requ _l uisites	isites/ Co-	None									
An	ti-requisites (if any)	None									
Objectives:			 To provide basic knowledge on management of construction works To make able to plan and schedule of resources required in construction project. To provide basic knowledge of procurement/contract management To provide basic knowledge on maintenance, specification and 									
				CO-PO Mapping								
Course Outcomes Co			urse Ou	itcome Statement	PO's / PSO's							
	CO1	An understand	ling of r	nodern construction practices	PO1, PO2, PO6, PO7, PO9, PO12/ PSO1							
	CO2	A basic abiliconstruction p	ity to plan, control and monitor PO1,PO2,PO5,PO6,PO7,PO9,PO10, rojects with respect to time and cost PO12/ PSO1, PSO2									

PO1,PO2,PO4,PO5,PO9,PO10,PO1

7 Hours

7 Hours

1,PO12/ PSO1, PSO2

CO4	An idea how construction projects are administered	PO1,PO2,PO4,PO5,PO6,PO9,PO10			
C04	with respect to contract structures and issues.	PO11,PO12/ PSO1, PSO2			
C05	Understanding of Earthwork machinery and	PO1,PO2,PO4,PO5,PO6,PO9,PO10,			
05	transportation	PO11,PO12/ PSO1, PSO2			
	TOTAL HOURS OF INSTRUCTION	ONS: 45			

An idea of how to optimize construction projects

Module No. 1 Introduction

based on costs

CO3

Need for project planning & management, time, activity & event, bar chart, Milestone chart, uses & draw backs.

Module No. 2 Program Evaluation and Review Technique

Construction of PERT network, time estimates, network analysis, forward pass & backward pass, slack, critical path, data reduction, suitability of PERT for research project, numerical problem.

Module No. 3	Iodule No. 3Critical Path Method8 Hours										
Definitions, network	construction, critical path, fundamental rules, determination of proje	ct schedule, activity time									
estimates, float types	, their significance in project control, numerical problems.										
Module No. 4	Cost analysis	8 Hours									
Type of costs, cost the	me relationships, cost slopes, conducting a crash program, determinin	g the minimum total cost									
of project, numerica	al problems, Updating a project, when to update, time grid diagra	am, resource scheduling.									

Planning of different components of civil engineering projects such as a house, high rise building, dam, and tunnel.

Module No. 5 Contract	S		15 Hours										
Importance of contracts; Type	s of Contracts, parties to a co	ontract; Common contract cl	auses (Notice to proceed,										
rights and duties of various p	parties, notices to be given C	ontract Duration and Price.	Performance parameters;										
Delays, penalties and liquidat	ed damages; Force Majeure,	Suspension and Terminatio	n. Changes & variations,										
Dispute Resolution methods. T	ractors, bull dozers, rippers, sci	rappers, power shovels, drag	line, hoes. Line diagram of										
each, sizes, output, uses, factor	s affecting selection of each eq	uipment, economic life of eq	uipment, maintenance and										
repair cost Hosts, Winches, Cr	anes, Belt conveyors, Ropeway	vs, trucks & Wagons.											
Lab Exercise													
1. Introduction to Primave	era software.												
2. Applying Critical Path	Method (CPM) in project mana	agement using Primavera.											
3. Understanding Primave	era Database and user interface												
4. Understanding Organiz	4. Understanding Organizational Breakdown structure (OBS) in Primavera software.												
5. Understanding Enterprise Project Structure (EPS) on Primavera P6.													
6. Creating Calendar in Primavera P6.													
7. Filtering in Primavera	7. Filtering in Primavera P6.												
 Setting Defaults for No Estimating Duration of 	ew Activities.												
10 Formatting Bars Colu	nns and Timescale												
11 Duration Types in Prir	navera P6												
12. Assigning Resources a	nd Reviewing Resource Alloca	tion.											
13. Assigning Baselines an	d Monitoring a Project.												
14. Developing Project Fu	nding Requirements and Cost S	-curve.											
15. Updating a Project with	n Resources and Expenses.												
Text Books	Equipment D L Deuriferry To	to MaCrowy Hill New Dalki	2024										
2 Construction Project Man	Equipment - K.L.Peuriloy - Ta	1.12 McGraw Hill, New Delli, 2021 Edition by Gerardus Blo	2024 okdyk The Art of Service										
3 PERT and CPM - L S Srin	ath East West Press 2015	1021 Lutton by Gerardus Die	Kuyk, The Art of Service.										
4. Building Construction 'Var	ghese P.C. Prentice Hall India.	2016											
5. Construction Technology	Chudley R, ELBS Publishers, 2	2007											
6. Project Planning with Pert	& CPM 'Punmia B.C., 2016												
References													
1. Gupta, B.L, Gupta, Am	nit; Construction Management a	and Machinary; Standard Pub	olishers Distributors										
2. Peurifoy, R L. Constr	uction Planning, Equipment	and Methods, McGraw Hi	11.										
3. Construction Equipme	ent & Planning and Applicat	ion Mahesh Verma Arte	c Publication.										
4. Construction Plannin	g and Management by U. K.	Shrivastava; Galgotia Put	blications Pvt. Ltd										
Course Type	Embedded Theory and Lab	(ETL)											
	Theory	75%											
	MST-1	15											
	MST-2	15											
Mode of Evaluation	Assignment/Quiz	20											
	Final Assessment Test	50											
	Laboratory	25%											
Prenared by	Mc Swati Pathak												
	Wis. Swati I athak												
Recommended by the Board of Studios on													
Date of Approval by													
the Academic Council													

PO/PS 0 CO	ро 1	РО 2	РО 3	РО 4	РО 5	РО 6	РО 7	РО 8	РО 9	PO1 0	PO1 1	PO1- 2	PSO 1	PSO 2
COL	2	1	0	0	0	1	1	0	1	0	0	1	1	0
<u>cor</u>	3	1	0	0	2	1	1	0	1	1	0	2	1	1
<u>cor</u>	2	2	0	1	1	0	0	0	2	1	1	2	1	1
<u>cos</u>	3	2	0	1	2	1	0	0	1	1	1	2	1	1
C04	3	2	0	1	2	1	0	0	1	1	1	2	1	1

Head Do-

Department of Civil Engineering Chandigarh Engineering College, Jhanjeri Mohali, Punjab 140307