PUNJAB TECHNICAL UNIVERSITY
TEACHING SCHEME OF B.TECH (CIVIL ENGG.)

THIRD SEMESTER

Course	Name of Course	L	T	P	Contact Hrs.	Ext.	Int.	Marks
Theory								
CE-201	Survey-1	3	1	-	4	60	40	100
CE-203	Fluid Mechanics-I	3	1	-	4	60	40	100
CE-205	Building Materials	3	-	-	3	60	40	100
CE-207	Solid Mechanics	3	2	-	5	60	40	100
HM-253	Principals Of Economics & Management	3	1	-	4	60	40	100
CE-209	Fluid Mechanics-I Lab	-	-	2	2	20	30	50
CE-211	Solid Mechanics Lab	-	-	2	2	20	30	50
CE-213	Workshop training of 4 weeks duration after 2nd semester	-	-	-		40	60	100
CE-215*	Survey-I lab	-	-	3		20	30	50

Fourth Semester

Course	Name of Course	L	T	P/D	Contact Hrs.	Ext.	Int	Marks
Theory								
CE-202	Survey-II	3	1	-	4	60	40	100
CE-204	Fluid Mechanics-II	3	1	-	4	60	40	100
CE-206	Building Construction	3	1	-	4	60	40	100
CE-208	Structural Analysis-I	3	1	-	4	60	40	100
CE-210	Rock Mech. & Engg Geology	3	1	-	4	60	40	100
CE-216	Environmental Science	3	1	-	4	60	40	100
Practicals								
CE-212*	Survey-II Lab	-	-	3	4	20	30	50
CE-214	Structural Analysis Lab	-	-	2	2	20	30	50
CE-218*	Fluid Mechanics-II Lab	-	-	2	2	20	30	50
	General Fitness						100	100

Survey Camp of 6 weeks duration at the end of 4th semester.

***indicates the subject, where changes have been made/New Subject.**

Scheme of B.Tech (Civil) Fifth Semester

Course	Name of Course	L	T	P/D	Contact Hrs.	Ext.	Int.	Marks
CE-301	Construction Machinery & Works Mgt.	3	1	-	4	60	40	100
CE-303	Design of Steel Structures-I	3	2	-	5	60	40	100
CE-305	Structural Analysis-II	3	2	-	5	60	40	100
CE-319*	Design of Concrete Structures-I	3	2	-	5	60	40	100
CE-309	Environmental Engg-I	3	1	-	4	60	40	100
CE-311	Transportation Engg-I	3	1	-	4	60	40	100
Practicals								
CE-313	Concrete Lab	-	-	2	2	20	30	50
CE-315	Environmental Engg Lab	-	-	2	2	20	30	50
CE-317	Survey Camp					40	60	100

Scheme of B.Tech (Civil) Sixth Semester

Course	Name of Course	L	T	P/D	Contact Hrs.	Ext.	Int.	Marks
Theory								
CE-302	Transportation Engg-II	3	1	-	4	60	40	100
CE-304	Geotechnical Engg.	3	1	-	4	60	40	100
CE-306	Irrigation Engineering-I	3	1	-	4	60	40	100
CE-308	Professional Practice	3	1	-	4	60	40	100
CE-310	Design of Concrete Structures-II	3	2	-	5	60	40	100
CE-312	Structural Analysis-III	3	1	-	4	60	40	100
Practicals								
CE-314	Transportation Engg. Lab	-	-	2	2	20	30	50
CE-316	Geotechnical Engg. Lab.	-	-	2	2	20	30	50
CE-318	Concrete Drawing (Computer Aided)	-	-	2	2	20	30	50
	General Fitness						100	100

***indicates the subject, where changes have been made/New Subject.**

Scheme of B.Tech (Civil) Seventh/Eighth Semester

Course	Name of Course	L	T	P/D	Contact Hrs.	Ext.	Int.	Marks
CE-	Industrial Training					500	500	1000

Scheme of B.Tech (Civil) Seventh/ Eighth Semester

Course	Name of Course	L	T	P/D	Contact Hrs.	Ext.	Int.	Marks
Theory								
CE-402	Hydrology & Dams	3	1	-	4	60	40	100
CE-406	Environmental Engg-II	3	1	-	4	60	40	100
CE-408	Design of Steel Structures-II	3	1	-	4	60	40	100
CE-410	Irrigation Engg-II	3	1	-	4	60	40	100
CE-412	Foundation Engg.	3	1	-	4	60	40	100
Practicals								
CE-416*	Design of Steel Structures-II Lab	-	-	2	2	20	30	50
CE-418*	Irrigation Engg-II Lab	-	-	2	2	20	30	50
CE-414	**Project**	-	-	4	4	80	120	200
(Any one of the following specilisation								
Environment Engg.								
GeoTech. Engg.								
Transportation Engg								
Hydraulic Structures								
Structural Engg.								
General Fittness							100	100

***indicates the subject, where changes have been made/New Subject.**

CE-205 Building Materials

Internal Marks: 40 **L T P**
External Marks: 60 **3 0 0**
Total Marks: 100

1. Building Stones: General, Qualities of a good building stone-Deterioration of stones-Preservation of stones, Common building stone of India & their Uses-Artificial stones. '

2. Bricks: General, Constituents of bricks, desirable and harmful ingredients in brick earth, qualities of good bricks, testing of bricks, strength, Absorption, weathering of bricks. Varieties of fire bricks, sand lime bricks, building tiles- roofing; flooring and wall tiles.

3. Lime: Cementing material, Characteristics of good quality lime, classifications & testing of Lime, Hydraulic test, acid test, setting & slaking of lime, uses of different varieties of lime

4. Concrete: Constituents of concrete, different types of cements used in concrete, brief introduction to ingredients and manufacture of cements. Hydration and compounds of hydration. Properties and testing of cement.

5.Concrete Mixes: Design of concrete mixes by ISI method and ACI method. Design of high strength concrete mixes. Design of concrete mix for flexural strength.

6.Production of Concrete: Introduction, Batching of materials, mixing of concrete materials, transportation and placing of concrete, compaction of concrete, curing of concrete.

7.Properties of fresh and hardened concrete: Introduction, workability, factors effecting workability, methods of determination of workability, strength of concrete, factors effecting strength of concrete, durability and permeability of concrete, factors effecting permeability of concrete, creep and shrinkage of concrete.

8. Timber: Advantages of timber construction, timber trees- exogenous and endogenous trees; soft and hard woods, structure of tree, felling of trees, defects in timber, characteristics of good timber, uses and testing of timber.

9. Miscellaneous Materials : Paints and varnishes; Distempering; white and color washing; glass and glass products; Asphalt and Bitumen. Commercial forms of iron & steel & their uses, use of plastics in civil Engg.

Recommended Book

1. Building Materials : Rangwala

CE-207 SOLID MECHANICS

Internal Marks: 40 **L T P**
External Marks: 60 **3 2 0**
Total Marks: 100

1 Simple Stresses and Strains: Introduction, stress-strain curves for elastic materials, different types of stresses and strains, elastic limit, Hookes' Law, Young's modulus of elasticity, Bulk modulus, modulus of rigidity, Lateral strain, Elongation due to self weight bars of tapering sections, bars of varying sections, equivalent area of composite sections, temperature stresses, relation between elastic constants. Volumetric strain.

2. Complex Stress: Introduction, rectangular block subjected to normal stresses along and across two planes, combination of normal and tangential stresses, pure shear, principal stresses and Principal planes, Mohrs Circle, Principal strains, Computation of Principal stresses from Principal strains.

3. Bending moment & shear force diagrams: Introduction, Types of beams, supports and loading, sign conventions for bending moments and shear forces, Shear force and Bending moment diagrams for simply supported, cantilever and overhanging beams for different types of loading. Relationship between Bending moment, Shear Force and loading Graphical method of plotting Bending Moment & Shear Force Diagrams.

4. Bending and Shear Stresses: Introduction, Assumption made in theory of simple bending, derivation of basic equation, determination of stresses in simple sections, built up sections and composite sections. (flitched Beams), Introduction to theory of unsymmetrical bending beams of uniform strength, variation of shear stress across depth of various beam sections.

5. Torsion: Introduction, torsion of shafts and springs, derivation of basic torsion equation, Power transmitted, sections subjected to combined bending and torsion, Principal stresses, equivalent Bending Moment & Torque, Helical spring, analysis of closed Coil helical spring.

6. Deflection of Beams: Derivation of basic equation of elastic curve, deflection in beams with different end conditions and different loadings by double integration method, Macaulay's method.

7. Columns and Struts: Introduction, Euler's buckling loads for columns with different end conditions, limitations of Euler's formula, column carrying eccentric loads, laterally loaded columns, empirical formula.

8. Strain Energy: Introduction, Strain Energy due to axial Loads, Bending shear and Torsional stress, Impact load, strain energy due to Principal stress & strains, theories of failure. (5 lectures)

Books Recommended:

1. Strength of Materials : Sadhu Singh
2. Strength of Materials ; E. Popov.
3. Strength of Materials : S.M.A. Kazimi

CE-215 Survey-I Lab

Internal Marks: 30 **L T P**
External Marks: 20 **0 0 3**
Total Marks: 50

1. Measurement of distance, ranging a line, plotting of details in chain survey.
2. Measurement of bearing and angles with compass, adjustment of traverse by graphical method.
3. Different methods of leveling, height of instrument, rise & fall methods.
4. Plane table survey, different methods of plotting two point & three point problem.

CE-212 Survey-II Lab

Internal Marks: 30 **L T P**
External Marks: 20 **0 0 3**
Total Marks: 50

1. Setting up temporary and permanent adjustment of a theodolite. Measurement of horizontal angles by repetition and reiteration methods using a theodolite. Measurement of vertical angle by theodolite.
2. Determination of tocheometric constants. Determination of reduced levels by techeometric observations.
3. Determination of height of an inaccessible object with instrument axis in the same plane as the object and in different planes.
4. Setting out a transition curve. Setting out of circular curves in the field using different methods

CE-218 FLUID MECHANICS-II Lab

Internal Marks: 30 **L T P**
External Marks: 20 **0 0 2**
Total Marks: 50

1. Verification of Stoke's Law
2. Boundry layer development on a flat plate
3. Determination of drag on a body in a wind tunnel.
4. Determination of manning's coefficients of rugosity.
5. Determination of elements of hydraulic jump.
6. Discharge and flow profile over a broad crested weir.

Books Suggested:

Experimental Fluid Mechanics: G.L.Asawa
Open Channel Hydraulics: V.T.Chow

CE-319 DESIGN OF CONCRETE STRUCTURE – I

Internal Marks: 40 **L T P**
External Marks: 60 **3 2 0**
Total Marks: 100

Note : Use of relevant Indian Standards is allowed.

1. Introduction to earth quake resistant design, intensity & Magnitude on lateral force analysis and basic concepts of seismic design as per IS-1893
2. Assumptions made in theory of RCC. Principle of design of flexural members by working stress and Limit State Methods.

Note: All design and analysis using Limit State Method for following topics.

3. Analysis of beams:
   Moment of Resistance of singly, doubly and flanged beams, Design of continuous beams.
4. Analysis of shear, bond and torsion.
5. Analysis of one and two way slabs, Design of flat slabs, Design of continuous slabs
6. Calculation of cracking and deflection for Limit State of Serviceability.
7. Design of axially and eccentrically loaded columns.
8. Design of Stair case.

Books Recommended:

1. Design of Reinforced Concrete Structures P. Dayaratnam
2. Reinforced Concrete Fundamentals Fergnson
3. Design of Concrete Structures Nilson and Winter
4. Reinforced Concrete Structural Elements Purshothaman
   Behavior, Analysis and Design
5. Reinforced Concrete Design Pillai & Menon
6. Limit State Design Ramachandra
7. Limit State Design A.K. Jain
8. Limit State Design of Reinforced Concrete P.C. Vergese
9. Earthquake Resistant design of structures by Pankaj Aggarwal & Manish Shikahande-PHI Publications.
10. Earthquake Design concept by CVR Murthy & Andrew Charleson published by Nicee-IIT Kanpur

CE - 315 ENVIRONMETAL ENGINEERING Lab

Internal Marks: 30 **L T P**
External Marks: 20 **0 0 2**
Total Marks: 50

1. To measure the PH value of a sample
2. To determine optimum Alum dose for Coagulation
3. To determine residual chlorine and to optimize dose and chlorine by breakpoint chlorination.
4. To find MPN for the bacterio- logical examination of H_2 O
5. To find the turbidity of a given sample
6. To find B.O.D. of a given sample
7. To measure D.O. of a given sample
8. Determination of Hardness of a given sample
9. Determination of total solids, dissolved solids, suspended solids of a given sample
10. To determine the concentration of sulphates in water/wastewater sample.
11. To find chlorides in a given sample
12. To find acidity/alkalinity of a given sample
13. To determine the COD of a wastewater sample.

BooksRecommended:-

1. Environment Engg. Chemistry by Sawyer & Macarty.
2. Standard Methods of examination of water & wastewater APHA, AWWA, WEF

CE – 304 GEOTECHNICAL ENGINEERING

Internal Marks: 40 **L T P**
External Marks: 60 **3 1 0**
Total Marks: 100

1. Basic Concepts: Definition of soil and soil mechanics common soil problems in Civil Engineering field. Principal types of soils. Important properties of very fine soil i.e. adsorbed water, Base Exchange and soil structure. Characteristics of main Clay mineral groups i.e. montmorilonite, illite and kaollite, Basic definitions in soil mechanics. Weight volume relationship theory and determination of specific gravity from picnometer test. Field denesity from sand replacement method and other methods.
2. Index Properties: Grain size analysis. Stock's law and Hydrometer analysis. Consistency and sensitivity Clay as per I.S. Code Atterberge Limits Flow Index and Toughness Index. Underlying theory of shrinkage limit determination. Classification of coarse grained soils. Classification of fine-grained soils as per Indian standard classification system (IS-1498-1970).
3. Compaction: Definition and object of compaction and concept of O.M.C. and zero Air Void Line. Modified proctor Test. Factors affecting compaction Effect of compaction on soil properties and their discussion. Field compaction methods- their comparison of performance and relative suitability. Field compacative effor. Field control of compaction by proctor.
4. Consolidation: Definition and object of consolidation difference between compaction and consolidation. Concept of various consolidation characteristics i.e. a_v, m_v and c_v primary and secondary consolidation. Terzaghi's Differential equation and its derivation Boundary conditions for Terzaghi's solution for one dimensional consolidation concept of c_v, t_v & U. consolidation test determination of c_v from curve fitting methods, consolidation pressure determination. Normally consolidated and over consolidated clays. Causes of over-consolidation. Effect of disturbance on e-Log sigma curves of normally consolidated clays, importance of consolidation settlement in the design of structures.
5. Permeability and Seepage: Concept of effective stress principal, seepage pressure, critical hydraulic gradient and quick sand condition. Capillary phenomenon in soil. Darcy's Law and its validity, seepage velocity, co-efficient of permeability and its determination in the laboratory. Average permeability of startified soil mass, factors affecting 'K' and brief discussion.
6. Shear Strength: Stress analysis of a two dimensional stress system by Mohr circle. Concept of pole. Coulomb's law of shear strength coulomb - Mohr strength theory. Relation between principal stesses at failure. Direct, triaxial and unconfined shear strength tests. Triaxial shear tests based on drainage conditions typical strength envelopes for clay obtained from these tests. Derivation of skempton's pore pressure parameters. Stress strain and volume change characteristics of sands.
7. Earth Pressure: 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 and derivations of expressions for K_a and K_p 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. Rankine's Earth pressure for a cohesionless backfill with sloping surface (with proof) concept of active and passive Earth pressure on the basis of stability of a sliding wedge. Coulomb's method for cohesion less backfill. Merits and demerits of Ranking and Coulomb's theories graphical construction and Rebhan's graphical construction (without surcharge load).
8. Stability of Slopes: Taylor's stability numbers, different methods of checking the stability of finite slopes.

Books:-

1. Soil Mech. & Foundation Engg, by K.R.Arora
2. Geotechnical Engineering, by P. Purshotama Raj
3. Soil Mech. & Foundation Engg., by V.N.S.Murthy

CE - 312 STRUCTURAL ANALYSIS III

Internal Marks: 40 **L T P**
External Marks: 60 **3 1 0**
Total Marks: 100

1. BASIC CONCEPTS OF STRUCTURAL ANALYSIS: Static and kinematic indeterminacies of beams, rigid-jointed plane and space frames, pin-jointed plane and space frames and hybrid structures, actions and displacements, action and displacement equations, generalized system of coordinates, unit-load method, conjugate-beam method, slope-deflection equations.
2. FLEXIBILITY MATRIX (PHYSICAL APPROACH): Basic definitions and types of matrices, matrix operations, matrix inversion, solution of linear simultaneous equations, matrix partitioning, development of flexibility matrices for statically determinate and in determinate beams, rigid-jointed plane frames and pin-jointed plane frames using physical approach.
3. STIFFNESS MATRIX (PHYSICAL APPROACH): Development of stiffness matrices for statically determinate and indeterminate beams, rigid-jointed plane frames and pin-jointed plane frames using physical approach, reduced stiffness matrix, total stiffness matrix, translational or lateral stiffness matrix.
4. STIFFNESS MATRIX (ELEMENT APPROACH): Transformation of system displacements to element displacements through displacement transformation matrix, transformation of element stiffness matrices to system stiffness matrix, development of stiffness matrices for statically determinate and indeterminate beams, rigid-jointed plane frames and pin-jointed plane frames using element approach, relation between flexibility and stiffness matrices.
5. STIFFNESS METHOD OF ANALYSIS: Analysis of continuous beams, rigid-jointed plane frames and pin-jointed plane frames using the physical and element approaches, effect of support settlements, temperature stresses and lack of fit, comparison of flexibility and stiffness methods of analysis.
6. FINITE ELEMENT METHOD (FEM): Basic concept, discretisation, procedure, elementary applications of principles and formulation of problems, steps of FEM (No Numerical Problems)

BOOKS RECOMMENDED:

1. Structural analysis- A matrix approach - GS Pandit and SP Gupta
2. Matrix analysis of framed structures - William weaver , Jr. James M. Gere
3. Basic structural analysis - C.S. Reddy
4. Finite element analysis - C.S. Krishnamurthy
5. Finite element methods - O.C. Zeincwicz.

CE-318 CONCRETE DRAWING (COMPUTER AIDED)

Internal Marks: 30 **L T P**
External Marks: 20 **0 0 2**
Total Marks: 50

Detailed Working Drawings (Computer Aided):

1. Isolated Footing : Rectangular, Circular and Square footing.
2. Combined Footing : Rectangular, Trapezoidal, Strap and Raft Footing
3. Spherical and Conical Domes
4. Cantilever and Counterfort Retaining Walls
5. Intz Tank
6. Design & detailing of an RCC multistorey frame with the help of design and detailing software.

CE-416 DESIGN OF STEEL STRUCTURES-II Lab

Internal Marks: 30 **L T P**
External Marks: 20 **0 0 2**
Total Marks: 50

Following drawings are to be prepared by students:

Industrial Buildings:-

1. Gantry girder and column bracket'
2. Lateral & Longitudinal bracing for column bent.

Railway Bridge

1. Stringer
2. Cross Girder
3. Main girder with welded joints
4. Portal sway bracings
5. Bearing rockers and rollers

CE-418 IRRIGATION ENGINEERING-II Lab

Internal Marks: 30	**L T P**
External Marks: 20	**0 0 2**
Total Marks: 50	

Following drawings are to be prepared by students:

1. Unlined canal sections
2. Lined canal sections
3. Guide Bank
4. Weir/Barrage
5. Head/ Cross regulator
6. Canal Fall (Sarda/ Inglis/ Straight Glacis/ Baffle Type)
7. Syphon Aqueduct
8. APM Outlet