

Course Code	Course Name	Course Type	Cd	L	T	P	Marks		
							Sessional	Final Exam	Total
CE-302	Structural Analysis-I	PCC	5	4	1	0	50	100	150

**Course Outcomes:**

At the end of the course the students will be able to:	
CO1	Evaluate different types of loading stresses and Draw S.F.D and B.M.D of different end conditions.
CO2	Understand the concepts of stresses, strains, Mohr's circle and analyze the deflection of the beam.
CO3	Gain the knowledge to apply Maxwell, Castigliano theorem for different kinds of columns under different conditions.
CO4	Analyze statically indeterminate structures and degree of redundancy.
CO5	Determine the deflection for determinate structures.

**Detailed Syllabus****Section –A**

**UNIT 1:** Shear force and bending: Simple stresses and strains, Hooks law, composite sections. Strain energy, stresses due to different type of loadings, gradually & suddenly applied loads. Shear force and bending moment for simply supported cantilevers, fixed beam, and continuous beams. Stresses in beams, theory of simple bending, neutral axis, bending stress distribution, shear stresses, unsymmetrical bending & shear centre.

**(9 Hrs)**

**UNIT 2:** Deflection of beams and Mohr's circle: Deflection of beams, slope, deflection and radius of curvature, derivation of slope deflection formula, Macaulay's method, principal stresses and strains, Mohr's circle, graphical and analytical method, strain energy in terms of principal stresses, ellipse of strain, thin cylinders, circumferential & longitudinal stresses.

**(9 Hrs)**

**UNIT 3:** Columns, struts and truss: Columns & struts, short & long columns Euler's theory, effective length, empirical formulae, eccentrically loaded columns, laterally loaded columns. Principle of virtual work, Maxwell's reciprocal theorem, first theorem of Castigliano, deflection of truss joints (determinate trusses) by Maxwell's method.

**(9 Hrs)****Section –B**

**UNIT 4:** Statically indeterminate structures: Second theorem of Castigliano and its applications for beams and portal frames degree of redundancy of structures, forces in members of redundant trusses (single degree).

**(11 Hrs)**

**UNIT 5:** Deflection of determinate structures: Conditions of equilibrium structures, cantilevers, compute deflections in simply supported beams using moment area method and conjugate beam method.

**(10Hrs)****Text Books**

S. No.	Name of the Books	Author	Publisher	Edition (Pub. Yr.)
1	Design of Concrete Structures.	Nilson, A. H.	McGraw Hill,	13 <sup>th</sup> (2004)
2	Elementary Structural Analysis	Wibur & Nooris,	McGraw Hill.	9 <sup>th</sup> (2015)

**Reference Books**

S.No.	Name of the Books	Author	Publisher	Edition (Pub. Yr.)
1	Strength of Materials	Ramamrutham	Dhanpat Rai	16 <sup>th</sup> (2011)
2	Strength of materials	S Timoshenko	CBS	3 <sup>rd</sup> (2002)
3	Structural Analysis-I	R.P. Rethaliya	Atul Prakashan	6 <sup>th</sup> (2012)