CE(PC)503	**Structural Analysis – I**	2L + 1T	3 Credits
Course Outcome	After going through this course, the students will be able to: **1.** Distinguish between stable and unstable and statically determinate and indeterminate structures. **2.** Apply equations of equilibrium to structures and compute the reactions. **3.** Calculate the internal forces in cable and arch type structures. **4.** Evaluate and draw the influence lines for reactions, shears and bending moments in beams due to moving loads. **5.** Use approximate methods for analysis of statically indeterminate structures. **6.** Calculate the deflections of truss structures and beams.		
Prerequisite	Introduction to Solid Mechanics (CE(ES)402)		
Module 1	**Basics of Structural Analysis**: Concept of static and kinematic indeterminacy, Determination of degree of indeterminacy for different types of structures. Theorem of minimum potential energy, law of conservation energy, principle of virtual work, the first and second theorems of Castigilano, Betti's law, Clark Maxwell's theorem of reciprocal deflection		3L+1T
Module 2	**Analysis of Determinate Structures:** Portal Frames, Three hinged arches, Cables		3L+2T
Module 3	**Deflection of Determinate Structures**: Energy methods. Unit Load method for beams, Deflection of trusses and Simple Portal Frames.		3L+2T
Module 4	**Influence Line Diagram:** Statically determinate beams and trusses under series of concentrated and uniformly distributed rolling loads, criteria for maximum and absolute maximum moments and shear.		6L+3T
Module 5	**Analysis of Statically Indeterminate Beams**: Theorem of three moments, Energy methods, Force method (Method of consistent deformation) [For analysis of propped cantilever, fixed beams and continuous beams (maximum two degree of indeterminacy) for simple loading case], Analysis of two hinged arch.		8L+4T
Module 6	**Influence Line Diagram for Indeterminate Structures:** Muller – Breslau principle.		3L+2T

Reference	**Sl.**	**Book Name**	**Author**	**Publishing House**
	1	Structural Analysis	R. Agor	Khanna Publishing House
	2	Structural Analysis (Vol I & Vol II)	S S Bhavikatti	Vikas Publishing House Pvt. Ltd
	3	Structural Analysis	Ramammurtham	
	4	Strength of Materials and Theory of Structures (Vol I & Vol II)	Punmia, Jain, Jain	Laxmi Publication
	5	Structural Analysis	R.C. Hibbeler	Prentice Hall
	6	Theory of Structures	Timoshenko and Young	McGrawHill
	7	Structural Analysis	Pandit and Gupta	TMH