B. Tech. Civil Engineering

Course code: Course Title	Course Structure			Pre-Requisite
CE209: Analysis of Structure - I	**L**	**T**	**P**	**CE104: Mechanics of Solid**
	3	**0**	**2**	

Course Objective: To familiarize the students with the concepts of Analysis of Determinate Structures.

S. No	Course Outcomes (CO)
CO1	Identify different forms of structural systems.
CO2	Construct ILD and analyze the beams and trusses subjected to moving loads.
CO3	Determine the deflections of trusses, beams, and frames using Energy Methods
CO4	Determine deflection of beams using the Double Integration Method, Macaulay's Method, Moment Area Method, and Conjugate Beam Method.
CO5	Analyze three-hinged arches and cables under different loading conditions.

S. No	Contents	Contact Hours
UNIT 1	**Introduction:** Types of structural forms, conditions of equilibrium, compatibility conditions, Degree of freedom, Linear and non-linear analysis, Static and kinematic indeterminacies of structural systems.	8
UNIT 2	**Influence Lines**: Concepts of influence lines, ILD for reactions, SF and BM for determinate beams, ILD for axial forces in determinate trusses. Moving Loads: Reactions, BM and SF in determinate beams, axial forces in determinate trusses for rolling loads using ILD.	8
UNIT 3	**Energy Principles and Energy Theorems**: Principle of virtual work, Betti's Law, Strain energy due to axial force, bending, shear, and torsion, and complementary energy. Determination of Deflection of beams, trusses, and frames using total Strain Energy, Castigliano's theorems, and Unit Load Method.	8
UNIT 4	**Deflection of Beams**: Analysis of the determinate beams with the application of the Double Integration Method, Macaulay's Method, Moment area method, and Conjugate beam method.	8

UNIT 5	**Arches and Cable Structures**: Analysis of the three hinged parabolic and circular arches with supports at the same and different levels. Analysis of cables under point loads and UDL, and determination of the length of cables for supports at the same and at different levels.	10
	Total	**42**

REFERENCES

S.No.	Name of Books/Authors/Publishers	Year of Publication / Reprint
1	Theory of Structures, Stephen P. Timoshenko and D. H. Young, McGraw-Hill International Book Editions.	1965
2	Theory of Structures (SMTS II), B. C. Punmia, A. K. Jain, A. K. Jain, Laxmi Publications Pvt. Ltd.	2004
3	Elementary Structural Analysis, A.K. Jain, Nem Chand & Bros. Publication.	2016
4	Structural Analysis, R.C. Hibbeler, Prentice Hall.	2012
5	Structural Analysis, Aslam Kassimali, Sengage Learning.	2011
6	Structural Analysis: A unified classical and matrix approach, A. Ghali, A M Neville and T G Brown, Spon Press.	2003
7	Strength of Materials: Vol. I: Elementary Theory and Problems, S. Timoshenko, CBS Publishers & Distributors Pvt. Ltd.	2004
8	Strength of Materials: Vol II, S. Timoshenko, CBS Publishers & Distributors Pvt. Ltd.	2002
9	Mechanics of Materials, James M. Gere and S. Timoshenko, CBS Publishers Pvt. Ltd.	2004
10	Structural Analysis – I, S.S. Bhavikatti, Vikas Publishing House.	2011