B. E. CIVIL ENGINEERING
Choice Based Credit System (CBCS) and Outcome Based Education (OBE)

18CV42	Course Code	ANALYSIS OF DETERMINATE STRUCTURES	Course Title	IV	Semester
4	Credits	3 – 1 – 0 – 4	L – T – P –TL*	50 Hours	Teaching Period
100 Marks	Total	60 Marks	SEE*	40 Marks	CIE*
*NOTE: L – Lecture; **T** – Tutorial; **P** – Practical; **TL** – Total; **CIE** – Continuous Internal Evaluation; **SEE** – Semester End Examination					

	Teaching Hours
Course Learning Objectives: This course will enable students to 1. To understand different forms of structural systems. 2. To understand concept of ILD and moving loads. 3. To determine slopes and deflections of beams and trusses. 4. To analyse arches and cables.	
Module-1 **Introduction and Analysis of Plane Trusses:** Structural forms, Conditions of equilibrium, Compatibility conditions, Degree of freedom, Linear and non linear analysis, Static and kinematic indeterminacies of structural systems. Types of trusses, Assumptions in analysis, Analysis of determinate trusses by method of joints.	**10Hours**
Module-2 **Influence Lines:** Concepts of influence lines-ILD for reactions, SF and BM for determinate beams, numerical problems. **Moving Loads:** ILD for Reactions, BM and SF in determinate beams using rolling loads concepts (Max. values and absolute max. values for beams subjected to multiple loads).	**10Hours**
Module-3 **Deflection of Beams:** **Moment area method:** Derivation, Mohr's theorems, Sign conventions, Application of moment area method for determinate prismatic beams, Beams of varying section, Use of moment diagram by parts. **Conjugate beam method:** Real beam and conjugate beam, conjugate beam theorems, Application of conjugate beam method of determinate beams of variable cross sections.	**10Hours**
Module-4 **Energy Principles and Energy Theorems:** Principle of virtual displacements, Principle of virtual forces, Strain energy and complimentary energy, Strain energy due to axial force, bending, shear and torsion, Deflection of determinate beams and trusses using	**10Hours**

total strain energy, Deflection at the point of application of single load, Castigliano's theorems and its application to estimate the deflections of trusses, bent frames, Special applications-Dummy unit load method.	
Module-5 **Arches and Cable Structures:** Three hinged parabolic with supports at the same and different levels. Determination of normal thrust, radial shear and bending moment. Analysis of cables under point loads and UDL. Length of cables for supports at same and at different levels.	**10Hours**

Course outcomes:

After studying this course, students will be able to:

1. Identify different forms of structural systems.

2. Construct ILD and analyse the beams subjected to moving loads

3. Understand the energy principles and energy theorems and its applications to determine the deflections of trusses and beams.

4. Determine the stress resultants in arches and cables.

Question paper pattern:

- The question paper will have ten full questions carrying equal marks.
- Each full question will be for 20 marks.
- There will be two full questions (with a maximum of four sub- questions) from each module.
- Each full question will have sub- question covering all the topics under a module.
- The students will have to answer five full questions, selecting one full question from each module.

Textbooks:

1. Reddy C S, Basic Structural Analysis, Tata McGraw Hill, New Delhi.
2. Muthu K U. et.al, Basic Structural Analysis, 2nd edition, IK International Pvt. Ltd., NewDelhi, 2015.
3. Bhavikatti, Structual Analysis, Vikas Publishing House Pvt. Ltd, New Delhi, 2002.

Reference Books:

1. Hibbeler R C, Structural Analysis, Prentice Hall, 9th edition, 2014.
2. Devadoss Menon, Structural Analysis, Narosa Publishing House, New Delhi, 2008.
3. Prakash Rao D S, Structural Analysis, University Press Pvt. Ltd, 2007.