# SYLLABUS

## STRUCTURALANALYSIS–I

**B. Tech. III Year I Sem.**

| Course Code | Category | Hours/Week | | | Credits | Maximum Marks | | |
|---|---|---|---|---|---|---|---|---|
| CE3101PC | Core | L | T | P | 3 | CIE | SEE | TOTAL |
| | | 3 | 0 | 0 | | 30 | 70 | 100 |
| ContactClasses:45 | Tutorial Classes :Nil | Practical Classes :Nil | | | | Total Classes:45 | | |
| Prerequisites: Strength of Materials & Engineering mechanics | | | | | | | | |

**Course Objectives:** The objective of the course is to

- Differentiate the statically determinate and indeterminate structures.
- To understand the nature of stresses developed in perfect frames and three hinged arches for various types of simple loads
- Analyse the statically indeterminate members such as fixed bars, continuous beams and for various types of loading.
- Understand the energy methods used to derive the equations to solve engineering problems.
- Evaluate the Influence on a beam for different static & moving loading positions

**Course Out comes:** At the end of the course the student will able to

**CO1:** An ability to apply knowledge of mathematics, science, and engineering
**CO2:** Analyze the statically indeterminate bars and continuous beams
**CO3:** Draw strength behavior of members for static and dynamic loading. Calculate the stiffness parameters in beams and pin jointed trusses.
**CO4:** Understand the indeterminacy aspects to consider for a total structural system.
**CO5:** Identify formulate and solve engineering problems with real time loading

**UNIT–I**

ANALYSIS OF PERFECT FRAMES: Types of frames - Perfect, Imperfect and Redundant pin jointed plane frames-Analysis of determinate pin jointed plane frames using method of joints, method of sections and tension coefficient method for vertical loads, horizontal loads and inclined loads.

**UNIT–II**

ENERGY THEOREMS: Introduction-Strain energy in linear elastic system, expression of strain energy due to axial load, bending moment and shear forces-

Castigliano's Theorem-Unit Load Method - Deflections of simple beams and pin-jointed plane frames - Deflections of statically determinate bent frames.

THREEHINGEDARCHES–Introduction–Types of Arches– Comparison between Three hinged and Two hinged Arches - Linear Arch - Eddy's theorem - Analysis of Three hinged arches - Normal Thrust and radial shear and bending moment - Geometrical properties of parabolic and circular arches - Three hinged parabolic circular arches having supports at different levels.

**UNIT-III**

PROPPED CANTILEVER and FIXED BEAMS: Determination of static and kinematic indeterminacies for beams-Analysis of Propped cantilever and fixed beams, including the beams with different moments of inertia - subjected to uniformly distributed load - point loads - uniformly varying load, couple and combination of loads - Shear force, Bending moment diagrams and elastic curve for Propped Cantilever and Fixed Beams - Deflection of Propped cantilever and fixed beams - effect of sinking of support, effect of rotation of a support.

**UNIT–IV**

CONTINUOUS BEAMS: Introduction-Continuous beams - Clapeyron's theorem of three moments- Analysis of continuous beams with constant and variable moments of inertia with one or both ends fixed-continuous beams with overhang-effect of sinking of supports.

SLOPE DEFLECTION METHOD: Derivation of slope-deflection equation, application to continuous beams with and without sinking of supports-Determination of static and kinematic indeterminacies for frames - Analysis of Single Bay, Single storey Portal Frames by Slope Deflection Method including Side Sway - Shear force and bending moment diagrams and Elastic curve.

**UNIT–V**

MOVING LOADS and INFLUENCE LINES: Introduction maximum SF and BM at a given section and absolute maximum shear force and bending moment due to single concentrated load ,uniformly distributed load longer than the span, uniformly distributed load shorter than the span, two point loads with fixed distance between them and several point loads-Equivalent uniformly distributed load - Focal length - Definition of influence line for shear force and bending moment - load position for maximum shear force and maximum bending Moment at a section - Point loads, uniformly distributed load longer than the span, uniformly distributed load shorter than the span- Influence lines for forces in members of Pratt and Warren trusses - Equivalent uniformly distributed load - Focal length.

**TEXTBOOKS:**

Structural Analysis Vol –I & II by V.N. Vazirani and M.M. Ratwani, Khanna Publishers. Structural Analysis VolI&II by G.S.Pandit and S.P.Gupta, Tata Mc Graw Hill Education Pvt. Ltd. Structural analysis T. S Thandava moorthy, Oxford university Press

**REFERENCES:**

Structural Analysis by R.C. Hibbeler, Pearson Education

Basic Structural Analysis by K.U.Muthuetal., I.K.International Publishing House Pvt. Ltd

Mechanics of Structures Vol–I and II by H.J.Shahand S.B. Junnarkar, Charotar Publishing House Pvt. Ltd. Basic Structural Analysis by C. S. Reddy., Tata Mc Graw Hill Education Pvt. Ltd.