

SHIV NADAR UNIVERSITY
U.G. / P.G. COURSE DESCRIPTION

- I. **Course Title:** Structural Analysis - II
- II. **Course Code:** CED301
- III. **Course Credits (L:T:P):** (3:0:0)
- IV. **Course Type:** Major
- V. **Prerequisite/s (If Any):** CED201, MED203, CED204
- VI. **Course Coordinators/Instructor(s):** Dr. Ghanshyam Pal
- VII. **School:** School of Engineering
- VIII. **Department:** Civil Engineering
- IX. **Objective:** CED301 is the second course of a two-course series intended to teach the techniques of determining the response of a structure to the external stimuli. The primary objective of this course is to teach the students the methods of analyzing the indeterminate structures using force based method, moment distribution method, Kani's method, slope deflection method and matrix stiffness method. The direct stiffness method covered in this course introduces the students to the finite element analysis. By the end of this course, the students learn to calculate the support reactions, internal forces / stresses and deflections for indeterminate structures such as continuous beams, frames and two hinges arc.
- X. **Learning Outcomes:** Upon successful completion of the course, students are able to:
- Understand analysis of statically indeterminate structures and its application to various structures.
 - Understand different methods and their advantages to analyze the indeterminate structures.
 - Introductory understanding of direct stiffness method and finite element analysis of statically indeterminate structures.
- XI. **Course Content:**
- Module 1: Introduction**
- Review of analysis for statically determinate structures; Degree of indeterminacy and stability of structures; Overview of analysis of indeterminate structures by force methods and displacement methods.
- Module 2: Analysis of Statically Indeterminate Beams**
- Theorem of three moments, energy methods; Flexibility coefficients; Two hinged arches: Reaction; horizontal thrust; Effect of yielding of supports, Temperature change; Column analogy method: method development; Analysis of beams by column analogy method.

Module 3: Analysis of Statically Indeterminate Structures

Moment distribution method: Introduction, method development, solution of continuous beam, effect of settlement and rotation of support, frames with or without lateral sway.

Kani's method: Introduction, basic concepts, application to beams and frames with and without side sway.

Slope deflection method: Introduction, development of slope deflection equations; Application to continuous beams and frames with and without lateral sway.

Module 4: Matrix Stiffness Method

Introduction, stiffness and flexibility coefficient, member stiffness matrix; Transformation, compatibility and equilibrium, assemblage of structural stiffness matrix; Imposing support conditions; Banded property of structural stiffness matrix, Computer implementation

XII. Recommended Books:

- [1] R. Hibbeler, Structural Analysis.
- [2] Devdas Menon, Structural Analysis.
- [3] Reddy, C.S., Basic Structural Analysis

XIII. Assessment Scheme #, *, **:

- [1] Assignment: 15 %
 - [2] Quiz: 15 %
 - [3] Mid Semester Exam: 20 %
 - [4] Class Participation: 10%
 - [5] Final Exam: 40 %
- # The above marking scheme is based on an absolute scale.
- * Minimum marks required to pass the course (on absolute scale): 50%
- ** Final grades will be assessed based on the relative (percentile) basis.